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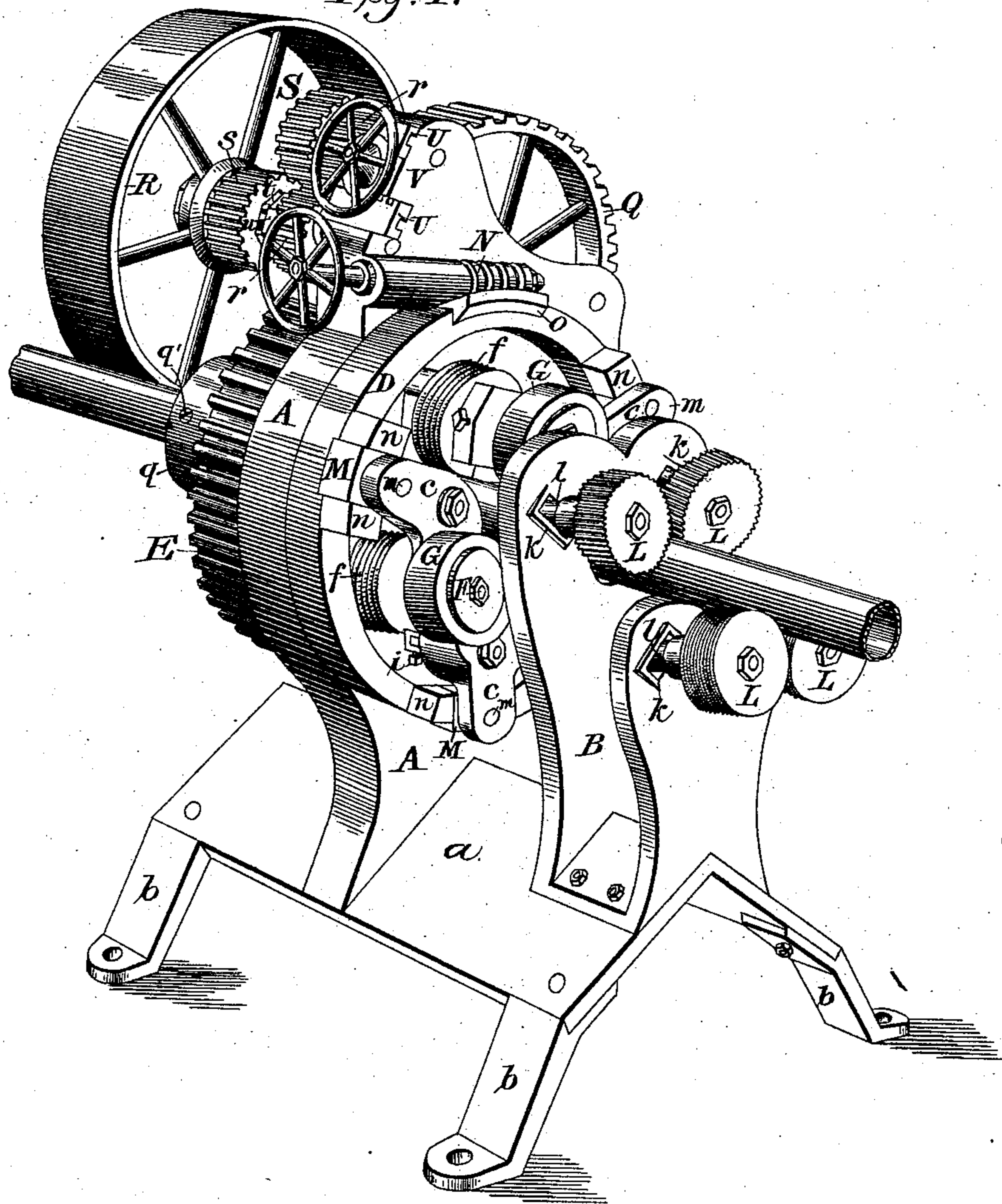
4 Sheets—Sheet 1.

H. OTTO.
FLUE CLEANING MACHINE.

No. 290,998.

Patented Dec. 25, 1883.

Fig. 1.



Witnesses:

J. H. Anderson

Henry C. Bell

Inventor:

Henry Otto.

(No Model.)

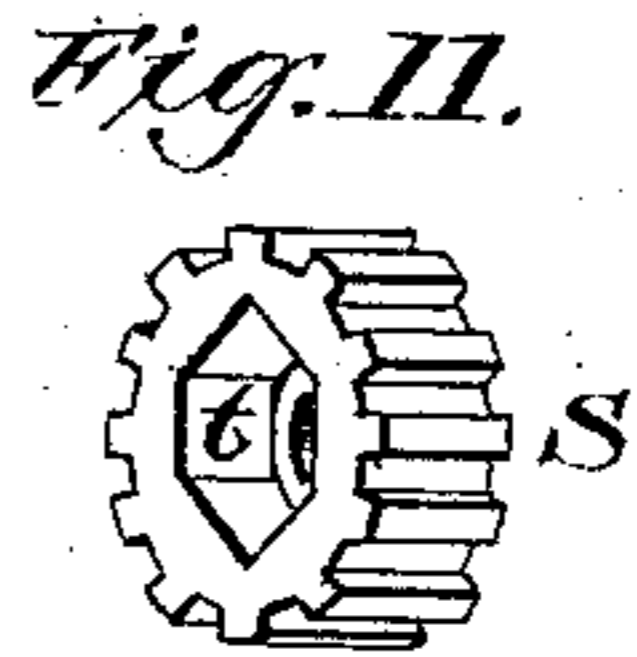
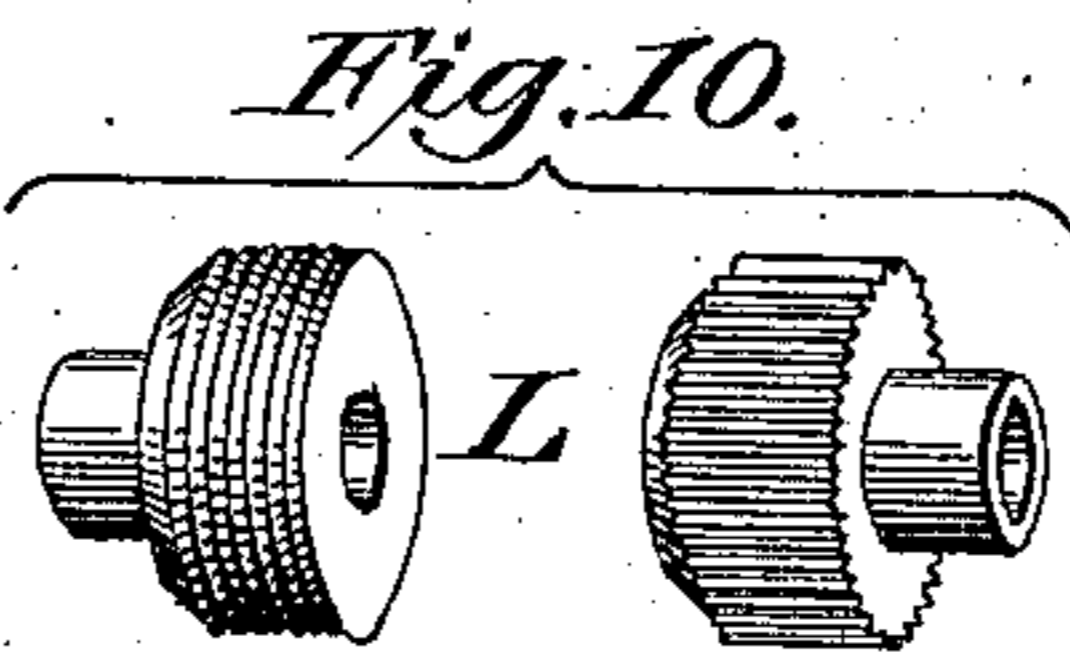
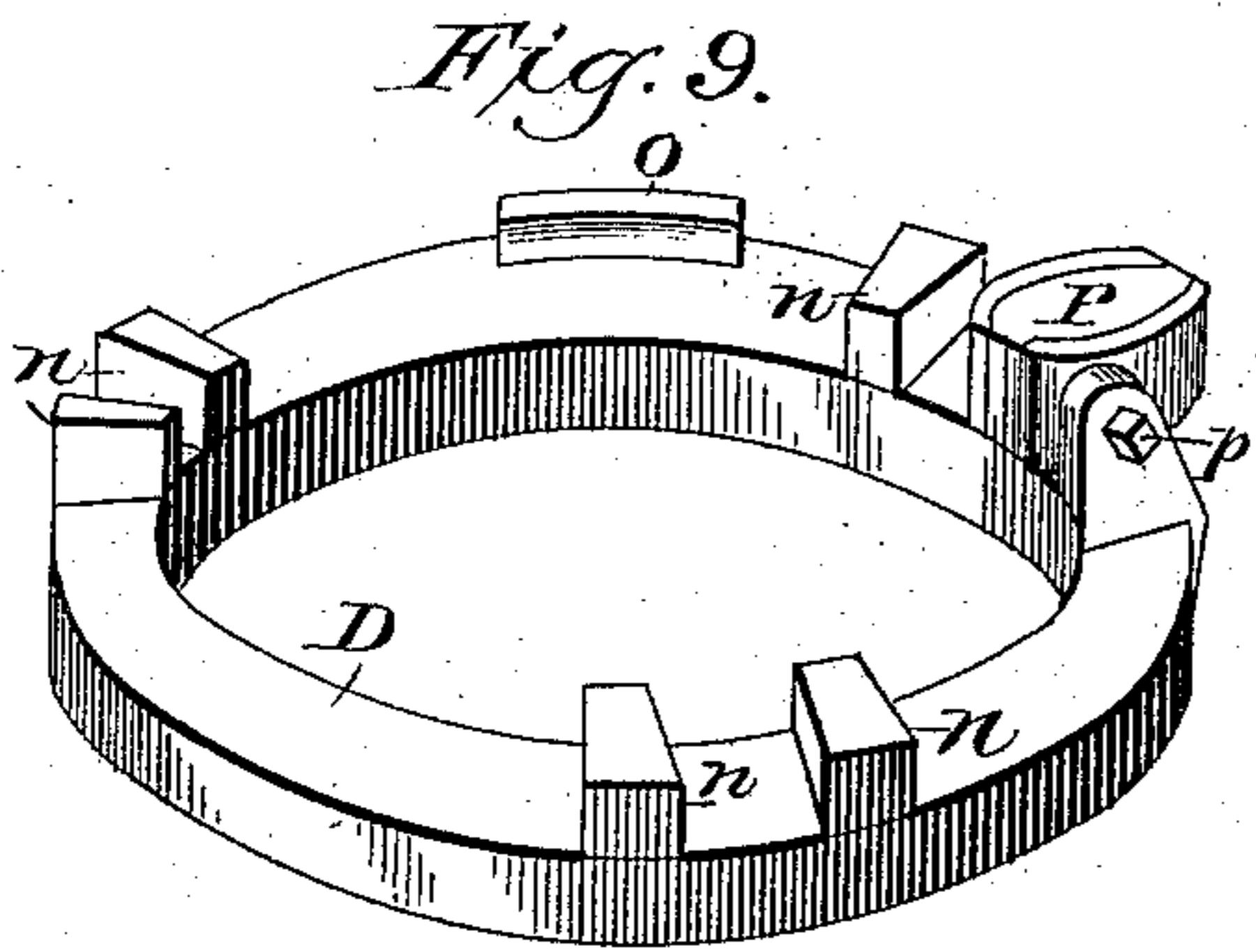
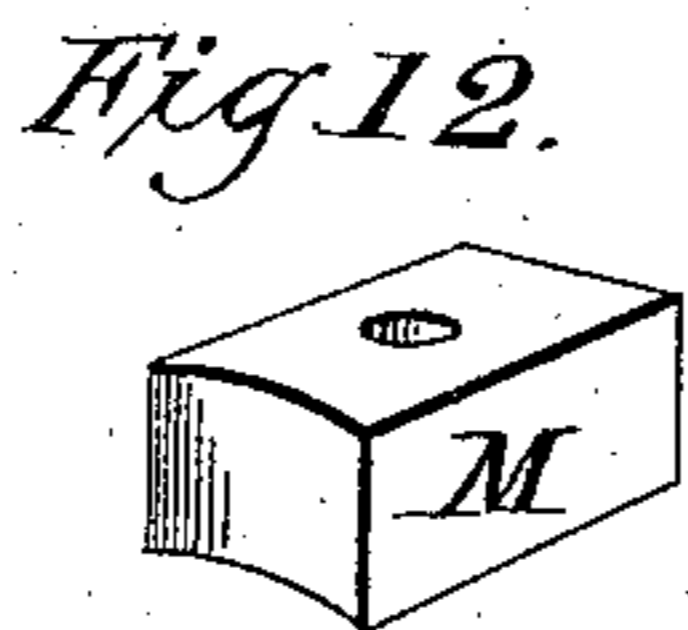
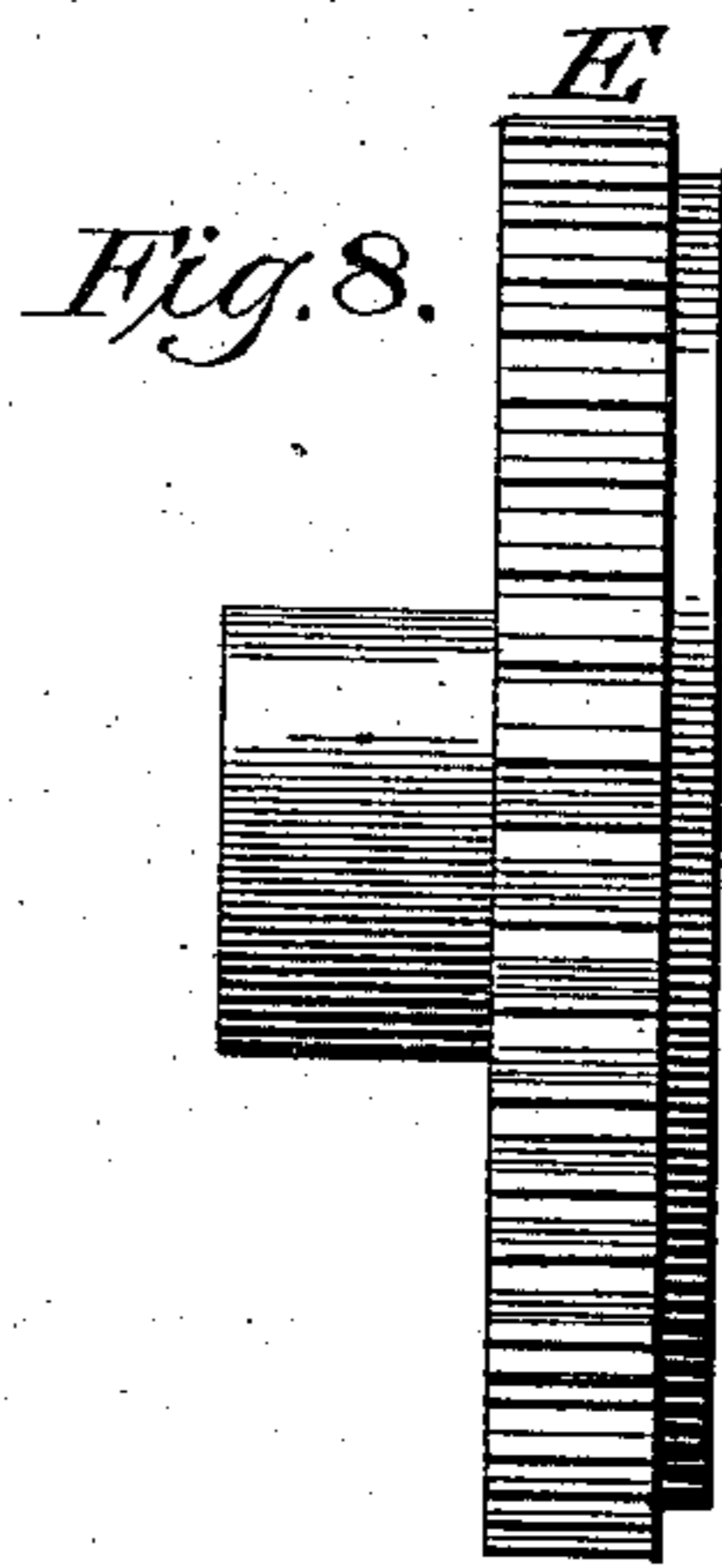
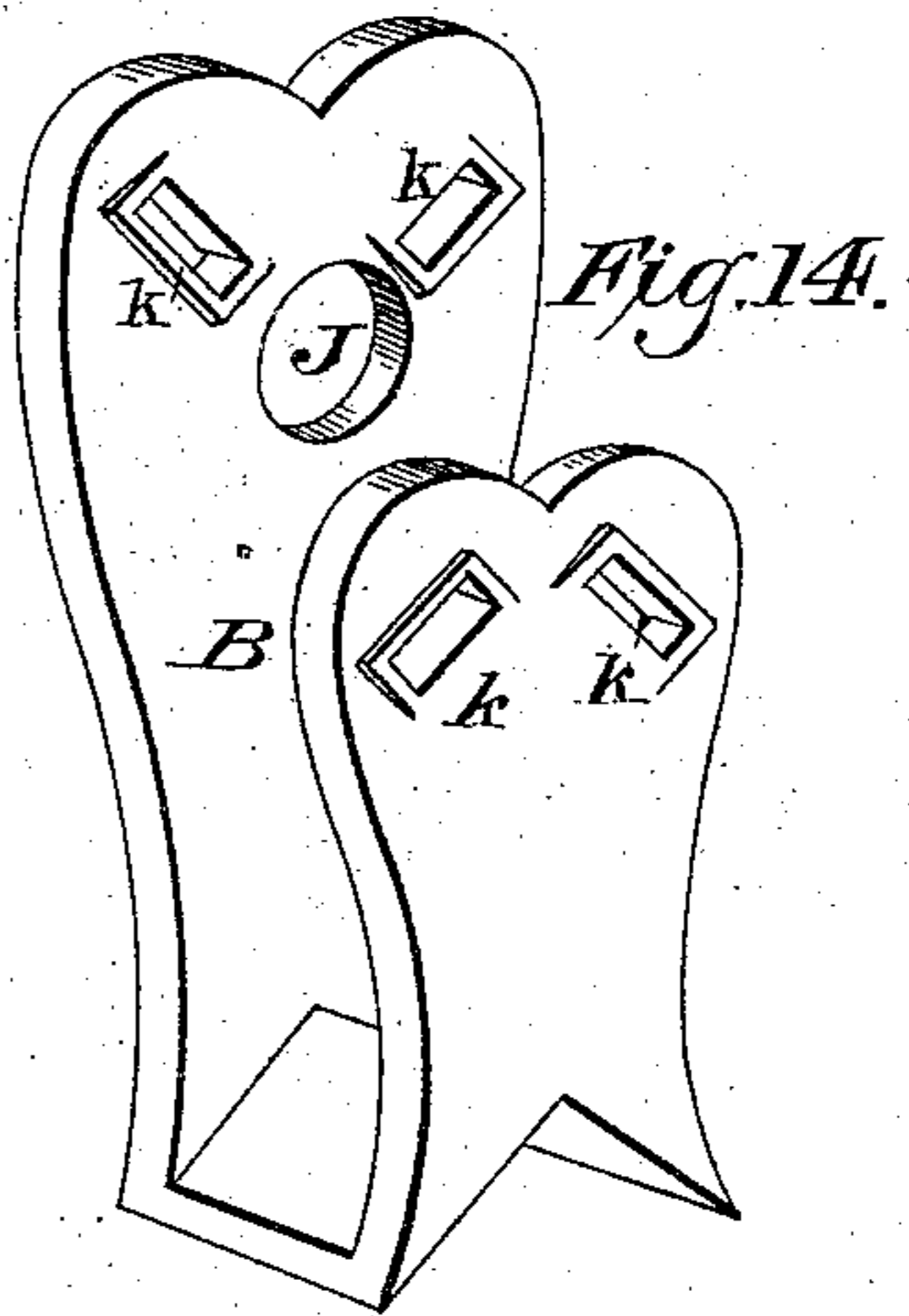
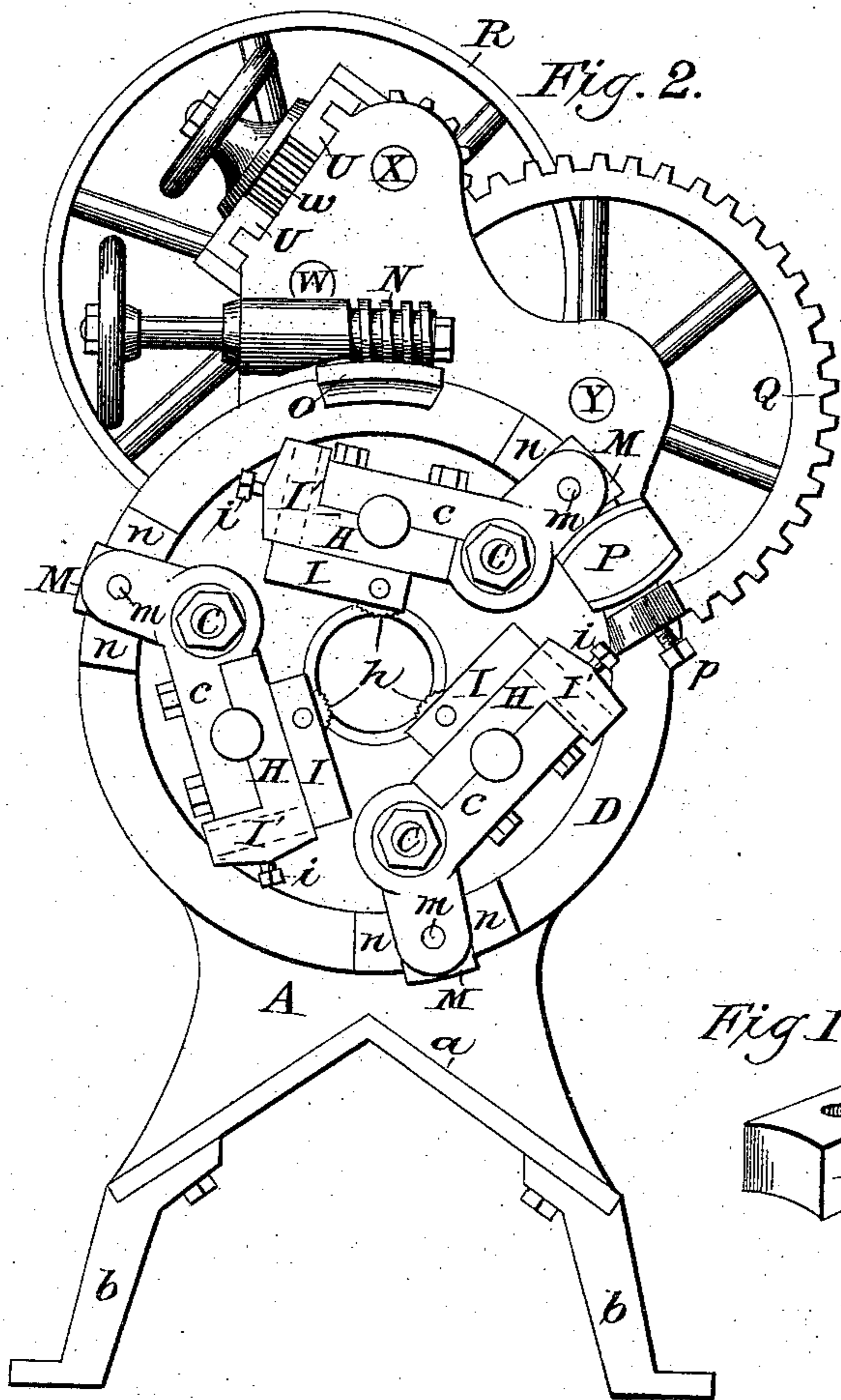
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Patented Dec. 25, 1883.



Witnesses,

St. Anderson
Henry C. Bell

Inventor,

Henry Otto.

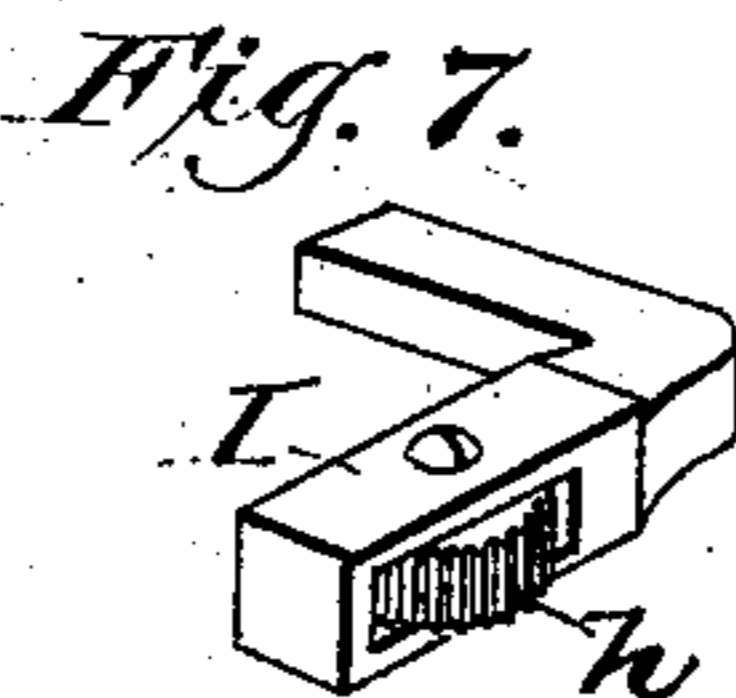
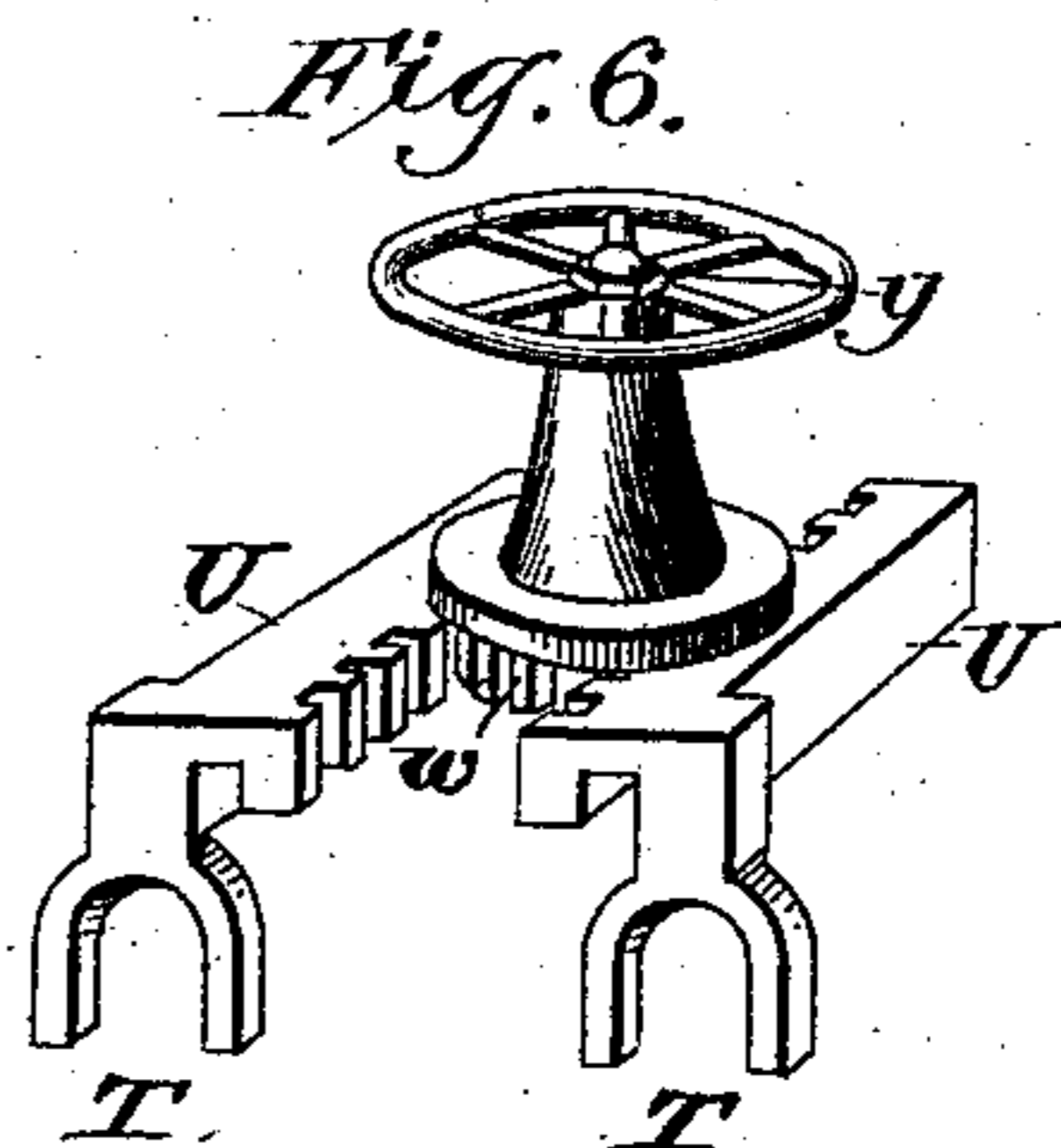
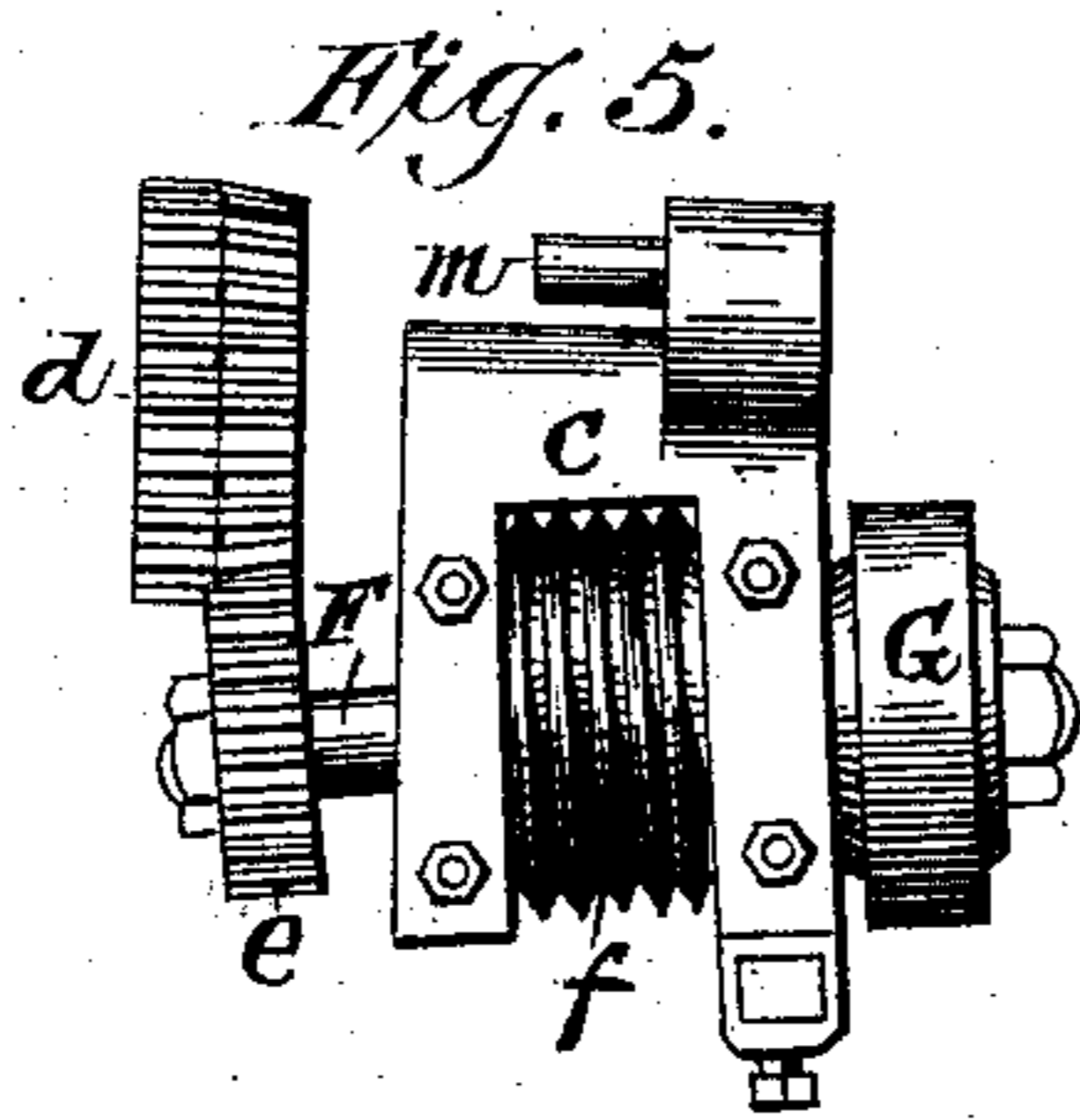
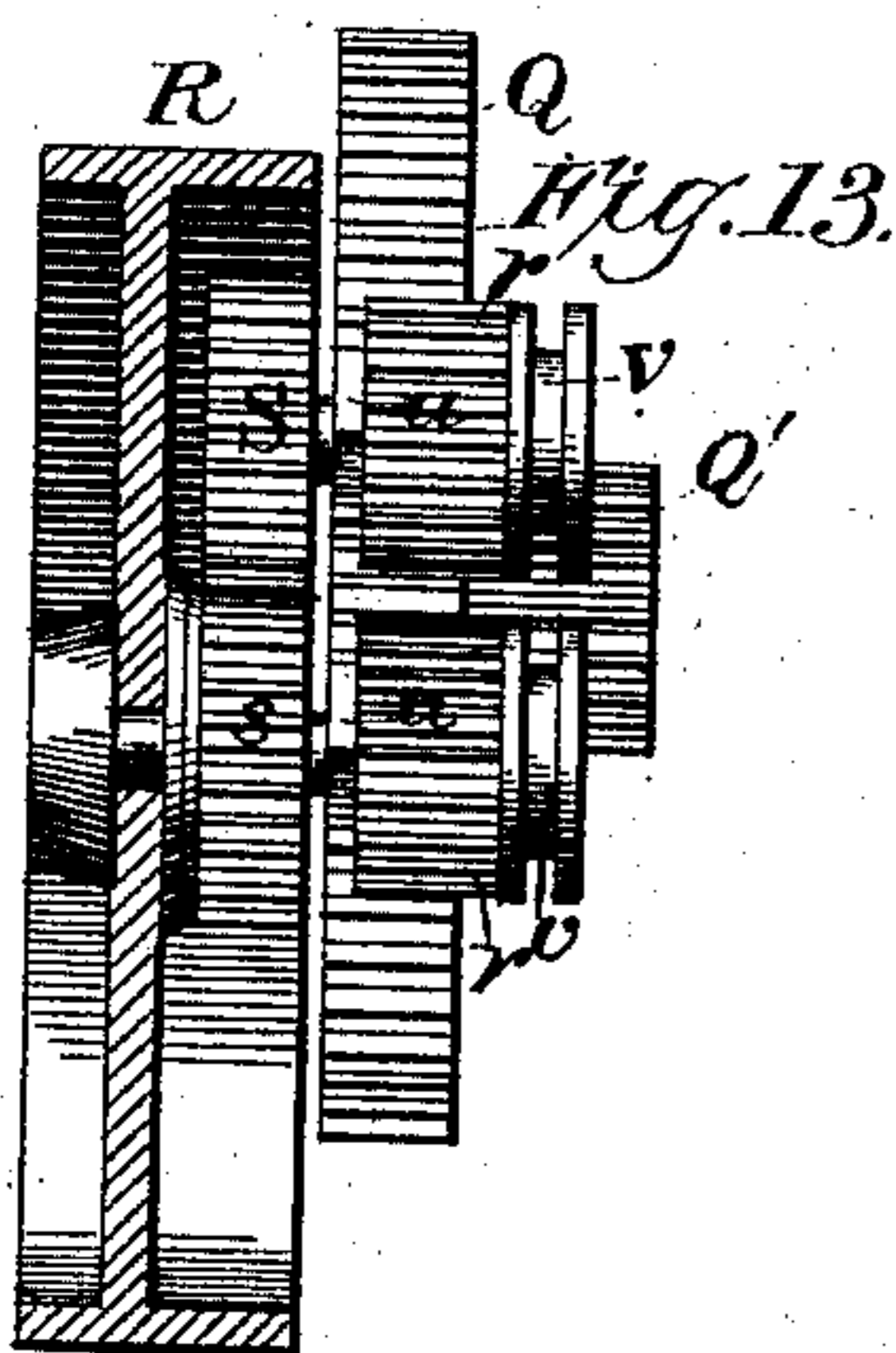
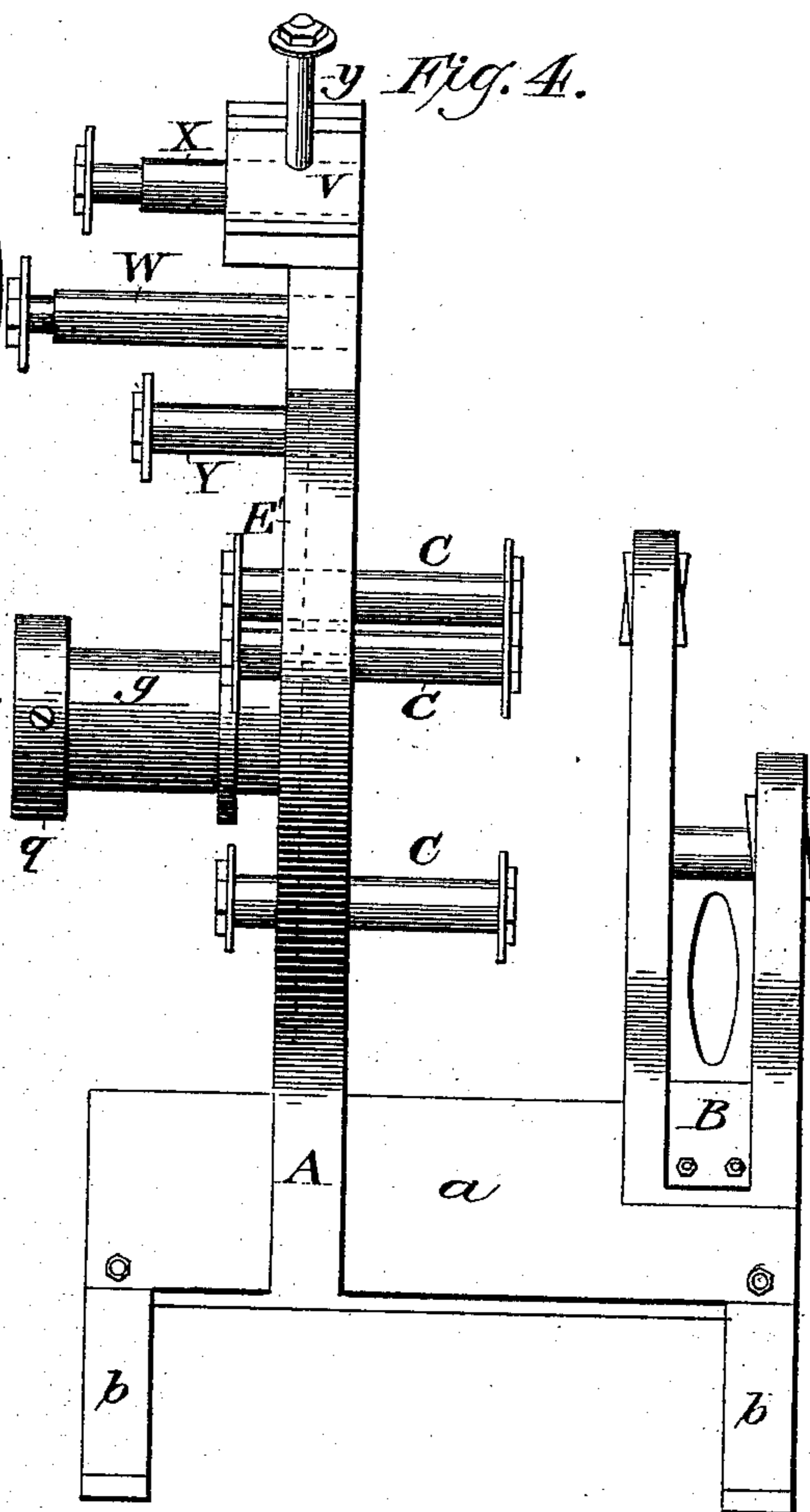
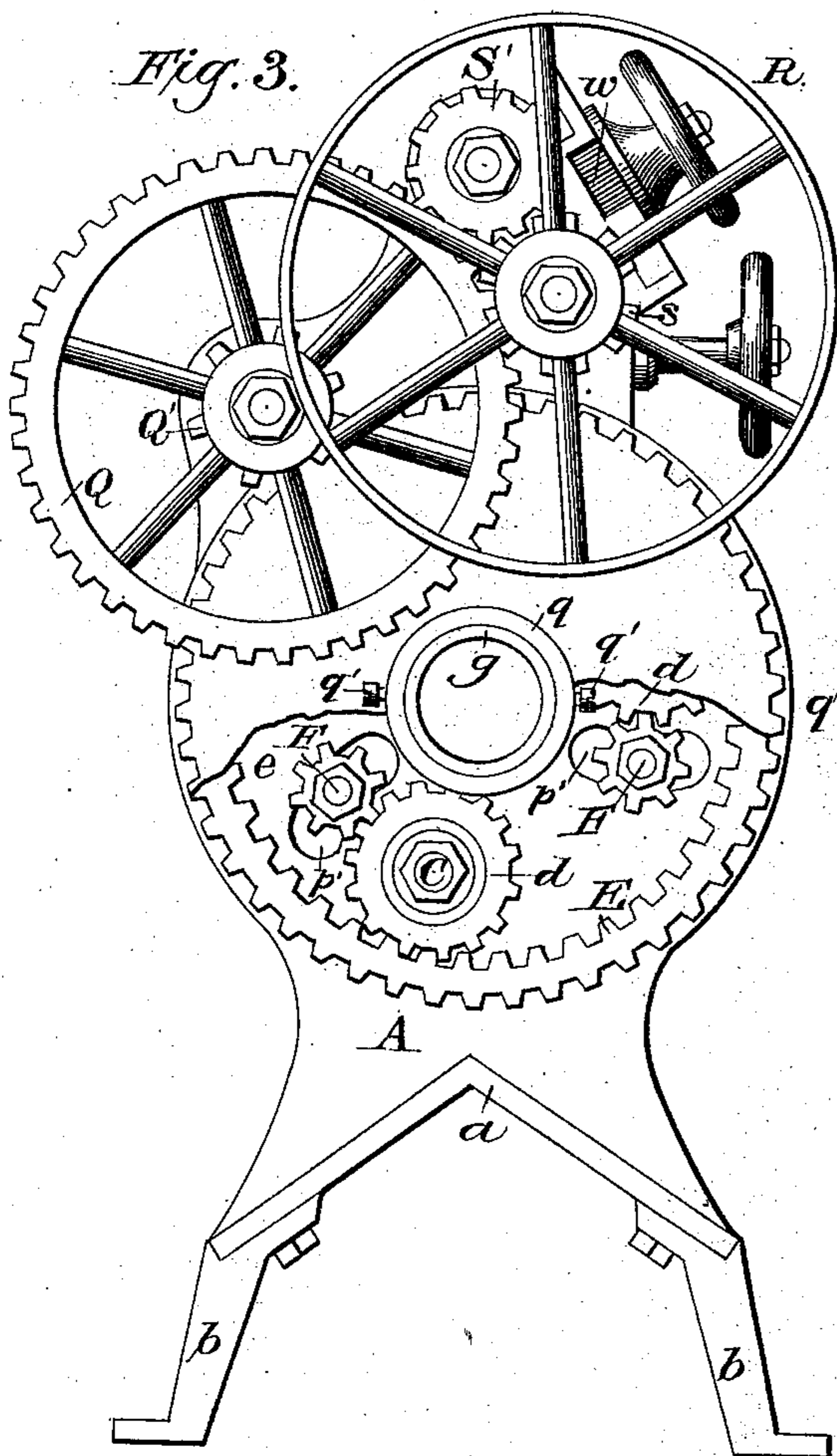
(No Model.)

4 Sheets—Sheet 3.

H. OTTO.
FLUE CLEANING MACHINE.

No. 290,998.

Patented Dec. 25, 1883.



Witnesses:
Hudson
Henry C. Felt

Inventor,
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(No Model.)

4 Sheets—Sheet 4.

H. OTTO.
FLUE CLEANING MACHINE.

No. 290,998.

Patented Dec. 25, 1883.

Fig. 15.

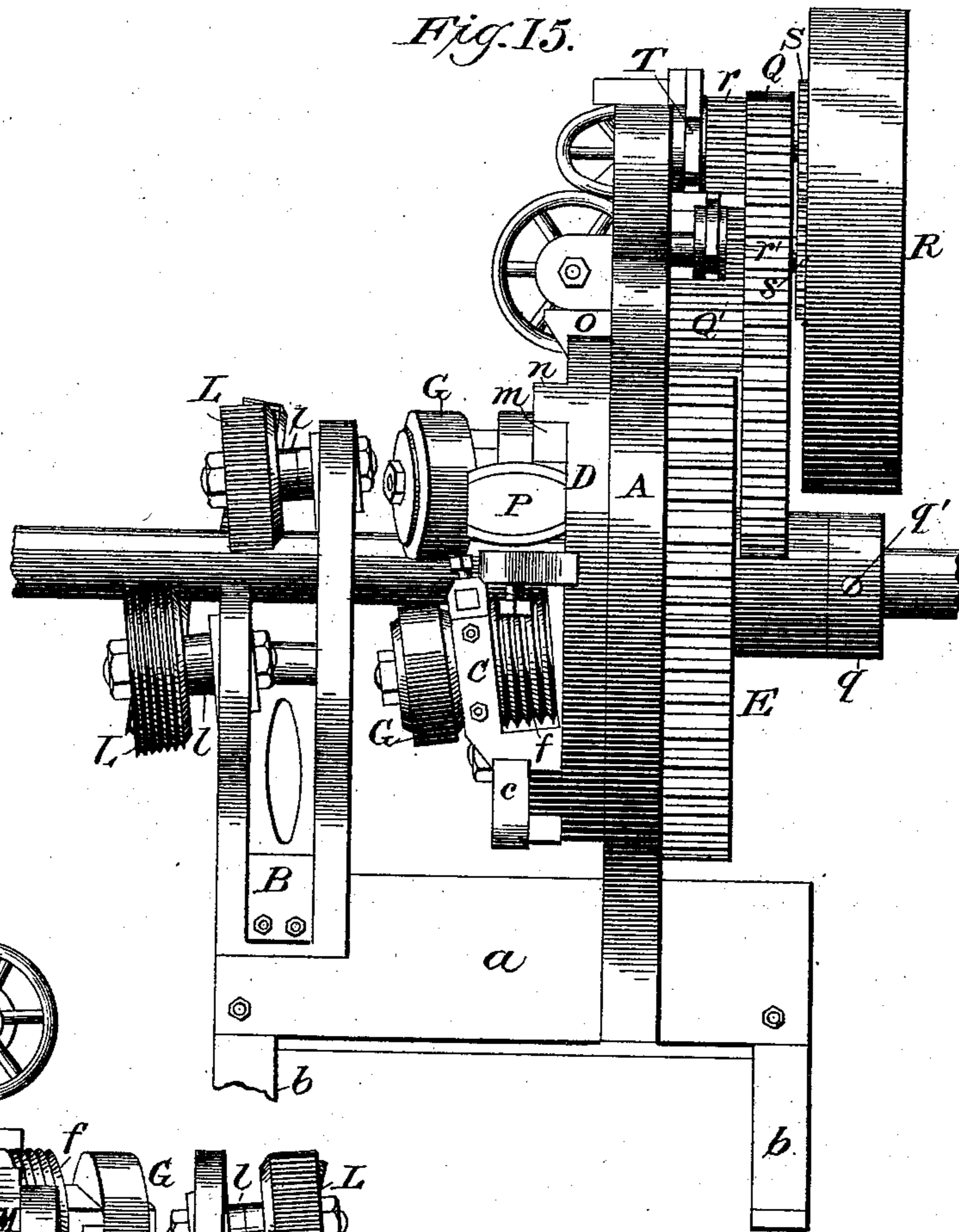
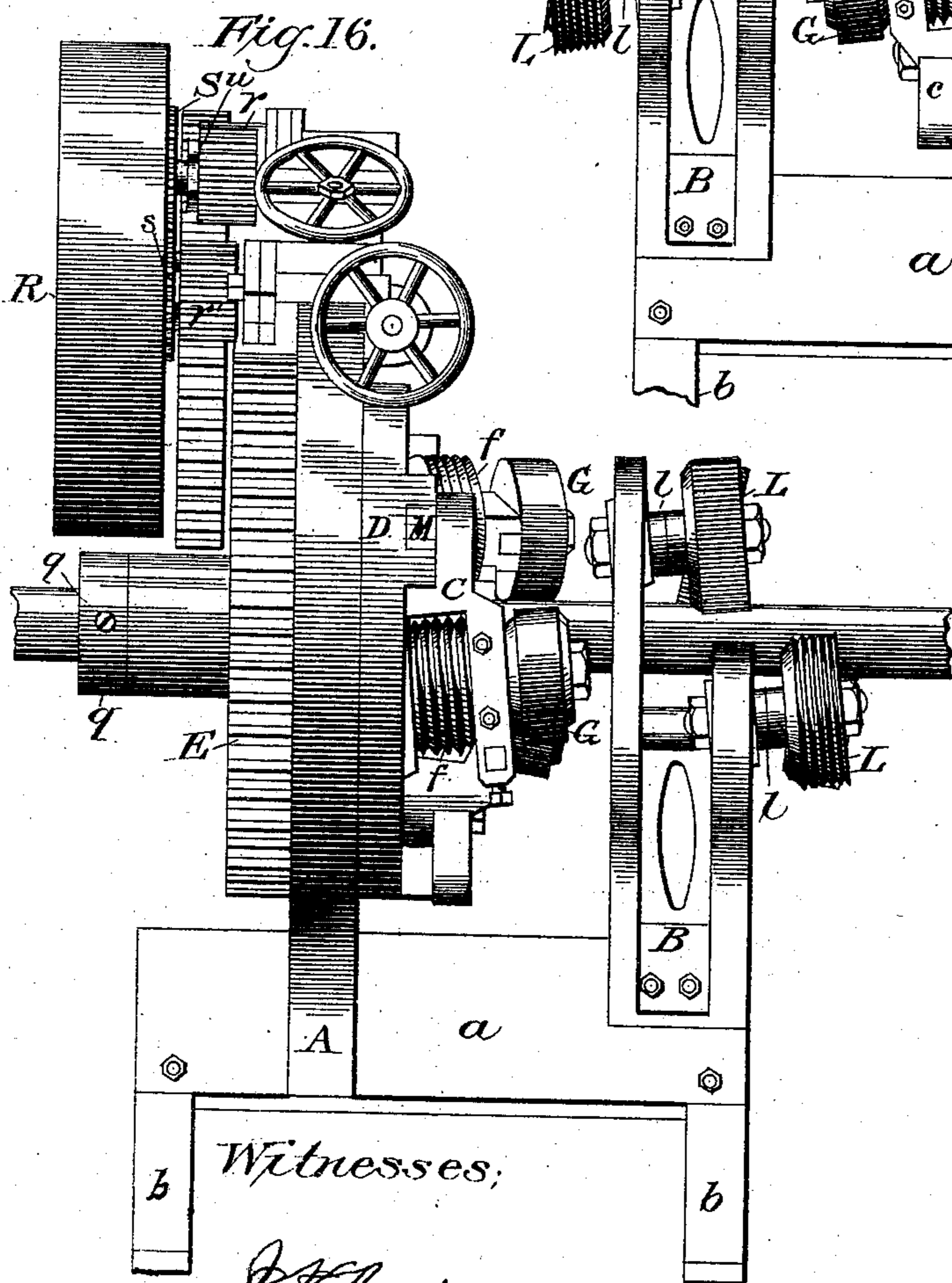


Fig. 16.



Witnesses;

J. H. Anderson
Henry C. Bell

Inventor;

Henry Otto.

UNITED STATES PATENT OFFICE.

HENRY OTTO, OF BLOOMINGTON, ILLINOIS.

FLUE-CLEANING MACHINE.

SPECIFICATION forming part of Letters Patent No. 290,998, dated December 25, 1882.

Application filed August 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, HENRY OTTO, a citizen of the United States, residing at Bloomington, in the county of McLean and State of Illinois, have invented a new and useful Flue-Cleaning Machine, (to clean off the crust of lime on the outside face of the flue,) of which the following is a specification.

The main principle of my invention consists in three revolving shafts provided with circular steel plates with sharp edges, (acting like the circular plates on a plow, by pressure, to press off only a narrow cut at a time,) said shafts placed in an inclined direction with the line of the flue in adjustable boxes or journals, to cause the flue between them to be revolved and fed lengthwise at the same time. Said cutting-plates are assisted by three small adjustable circular cutters with teeth in a direction parallel with the flue, connected to said boxes, so that the lime will be cut into square particles in a rough manner, and the same process will be repeated by four circular cutters, two of them with circular and the others with transverse teeth, to clean off the rest. The machine is reversible and adjustable to the various sizes of flues now in use, by means of a ring with worm-screw connected with said boxes. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a perspective side view of the entire machine. Fig. 2 is a front view of the machine as it appears after the removal of the revolving shafts and extending plate. Fig. 3 is a rear end view of the machine. Fig. 4 is a side view of the frame with the fixed shafts and extending plate. Fig. 5 is a top view of one box with cutters, rubber feeder, pinion, bolts, set-screw, and cog-wheel. Fig. 6 is a detailed view, in perspective, of the clutch mechanism. Fig. 7 is a perspective view of one assisting cutter with casing and stem. Fig. 8 is a side view of the main wheel. Fig. 9 is a perspective view of the ring with rubber spring, shell-plates, and set-screw. Fig. 10 is a perspective view of two finishing-cutters, the one with circular teeth, the other with transverse teeth. Fig. 11 is a perspective view of the gear-wheel, connecting the pulley with one of the clutch-pinions. Fig. 12 is a per-

spective view of one block. Fig. 13 is a side view of the pulley, gear-wheel, clutch-pinions, and compound gear. Fig. 14 is a perspective view of the extending plate. Figs. 15 and 16 are elevations of opposite sides of the machine.

Similar letters refer to similar parts throughout the several views.

The upright plate A, the A-shaped platform *a*, its legs or standards *b b b b*, and the extending plate B constitute the frame-work of the machine. The upright plate A is provided with three fixed shafts, C, extending on each side of it, on the front, to place three boxes, *c*, or journals on them, movable by the ring D, referred to hereinafter, on the rear, to place three loose cog-wheels, one on each of them, the cogs of which are shaped square on their outer half, (see Fig. 5,) to connect with the inside gear of the main wheel E, (see Fig. 3,) the inner half being beveled to connect with three pinions, *e*, fastened to the rear end of the revolving shafts F, one on each of them, the shafts running in said boxes *c*. (See Figs. 2 and 5.) The boxes are levers swinging on the fixed shafts and connected by their outward projecting ends with the ring D; their inner ends forming jaws or double boxes *c*, with covers H fastened to them with bolts or studs, allowing space for the circular cutting-plates *f*, placed between them on the revolving shafts F, the front ends of which are provided with three circular rubber feeders, G, one on each shaft. (See Figs 1 and 5.) The three revolving shafts are placed on an inclined line in relation to the straight line of the flue, which passes between them through the center tube, *g*, which is fastened to the upright frame-plate A, (see Fig. 4,) and therefore they will cause the flue to revolve and to be fed lengthwise like a screw. The flue enters into said tube *g* from the rear end of the machine between said circular cutting-plates *f*, and the first one on each shaft which it comes in contact with will be about one-sixteenth of an inch distant from the face of the flue, on account of the inclined line of said shafts, but will cut off the greater part of the lime-crust and afford an easy entrance for the flue, while the second one will be only one thirty-second of an inch from it, and the remaining

three cutting-plates on each shaft will actually bear on the surface of the flue. The cutting-plates are about three-eighths of an inch in thickness; but, on account of having the three revolving shafts C C C, placed at different distances from the center, the cutting-plates on one shaft will not follow the cut produced by those of another, but will produce their own cut between those of the others, so actually there will be one cut at every eighth of an inch on the face of the flue. In order to enable the machine to clean all sizes of flues, the incline of the revolving shafts is arranged to be in harmony with the largest-sized flue to cover all the surface by one revolution thereof. The circular cutting-plates will always pass over so much surface in a given time, (to preserve the principle of cutting,) the next smaller flue in size will revolve as much faster as its diameter is smaller, and consequently the smallest flue will revolve the fastest, making up in speed what it will lose in feed.

The box-covers H on the front journal of the jaw-boxes c are each provided with an extending end, I', formed with a hole. A small circular assisting-cutter, h, with cross-teeth, revolves on a steel pin inside a casing, I, (see Fig. 7,) which terminates in a stem, by which it is adjustably connected to said hole in the extending end I' of the cover H by a set-screw, i. (See Figs. 2 and 5.) The assisting-cutters h are revolved by the friction of the flue and placed on the same incline with the revolving shafts. The circular cutting-plates on said shafts will cut the lime on the flue crosswise, while the assisting-cutters will cut it lengthwise, reducing it to square particles.

The extending plate B is shaped on its middle part like a saddle, forming the base for two upright projecting ends in the shape of plates, the one on the front, the other on the rear end of said saddle, each of them provided with two inclined slots, k, (corresponding with the inclined line of the revolving shafts,) to apply four circular finishing-cutters, L, one to each of them, revolving on shouldered studs l, (by the friction of the flue passing between them,) fastened with nuts adjustably to suit the different sizes of flues passing between them. The rear end plate is provided with a central hole, J, for the passage of the flues, having its slots above the center and two finishing-cutters with cross-teeth (to cut the lime on the flue lengthwise) placed on the front face of said plate. The front plate is made low enough to allow the largest-sized flue to pass freely over it, having its slots below the center and two finishing-cutters with circular teeth (to cut the lime on the flue crosswise) placed also on the front face of said plate.

If a flue is fed through the machine so that its rear end will clear the front faces of the rubber feeders, it will be held there stationary and centrally in line, so that it cannot damage the rubber feeders by the four finishing-cutters until the front end of the following

flue comes in contact with the rear end of the preceding one, when it will be revolved again and fed out to clear the front faces of the two upper finishing-cutters, and by its weight will drop off without any assistance from the person running the machine.

The ring D slides and is held in position on the front face of the upright frame-plate A by the outer ends of the boxes c, which are provided each with a projecting pin, m, (see Fig. 5,) passing through a block, M, (see Fig. 12,) sliding between projecting shoulders n on the ring, (see Figs. 2 and 9,) to accommodate the motion of the boxes to the circular motion of the ring, and to hold them steady in any position. The ring, by means of its worm-nut o, is governed by a worm-screw, N, attached to a projecting shoulder on the upright frame-plate A, and worked or operated by a hand-wheel. The three boxes c, swinging on the three fixed shafts C, can be moved with the assisting-cutters by said worm-screw either way to suit any size of flues while the machine is in motion, without interfering with the relation of the running-gear, because said fixed shafts are the common center of the motion. The upright frame-plate is provided with three slots, p', to give free play to the revolving shafts. (See Fig. 3.) The upper swinging box c is enabled to vibrate outward by the application of a rubber spring, P, between two shell-plates, and governed by a set-screw, p, which is attached to a projecting shoulder on the ring. (See Figs. 2 and 9.) Flues are often set out with an expanding-tool near their rear ends, which will increase their diameter, while many are oval on some places. All those unevennesses are overcome by the vibration allowed by the spring P.

The main wheel E revolves on the outside face of the tube g, and is held in place by a ring, q, secured to the rear end of said tube by screws q', (see Figs. 3 and 4,) and is provided on its forward portion with outside and inside cogs, (on the inside to drive the three loose cog-wheels d, on the outside to be driven by the compound gear Q Q',) and by its forward portion, which itself is covered by a projecting ridge, E', on the periphery of the upright frame-plate A, (see Fig. 4,) will close in and protect the cog-wheels and pinions against dust.

The compound gear Q Q' is driven by two clutch-pinions, r r', alternately. One of them, r', is placed loosely on the same fixed shaft, W, with the pulley R, the other, r, loosely on an extra fixed shaft, X, together with a connecting gear-wheel, S, on the rear end of said shaft X. Said gear-wheel S is driven by the gear-wheel s, secured to the pulley R, and in the reverse direction. The front face of the gear s on the pulley R, as well as that of the connecting gear-wheel S, is provided with a six-sided cavity, t, to connect alternately with the six-sided rear ends, u, of the two clutch-pinions r r', each of which is provided with a groove, v, to connect with a forked rack-bar, U, sliding on project-

ing ridges of a platform, V, on the upper end of the upright plate A, and governed by a central pinion, *w*, with a hand-wheel revolving on a central stem, *y*, fixed to said platform V. The
5 clutch-pinions can be set neutral to free the pulley, so the machine does not require a counter-shaft.

The machine will support the flue from one end to the other without the assistance of standards or resting-places outside of it, which could
10 not be applied, because most of the flues are more or less bent, and as the part of them passing through the machine is held central by the cutters the outer ends ought to be at liberty
15 to swing.

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

1. The combination, in a flue-cleaner, of three revolving shafts, F, with circular cutting-plates
20 *f*, rubber feeders G, pinions *e* in journals or boxes *c*, with assisting-cutters *h*, swinging on three fixed shafts, C, and connected by loose

cog-wheels *d* to the main wheel E, which is by a compound gear, Q Q', connected with two
clutch-pinions, *r r'*, one of them driven by the
25 pulley R direct, the other by a connecting gear-wheel, S, indirectly, said clutch-pinions *r r'* connected with a center pinion, *w*, with hand-wheel by means of two forked rack-bars, U,
all substantially as set forth. 30

2. The combination, in a flue-cleaner, of a movable ring, D, with an adjustable rubber spring, P, and governed by a worm-screw, N, with hand-wheel, said ring being connected
35 with three boxes, *c*, substantially as set forth.

3. The combination, in a flue-cleaner, of four circular finishing-cutters, L L L L, adjustably connected with the extending plate B, all substantially as set forth.

HENRY OTTO.

Witnesses:

J. H. ANDERSON,
HENRY C. FELL.