(No Model.) 2 Sheets—Sheet 1.

T. S. DISSTON.

APPARATUS FOR HARDENING SAW OR OTHER STEEL BLADES.

No. 401,138. Patented Apr. 9, 1889.

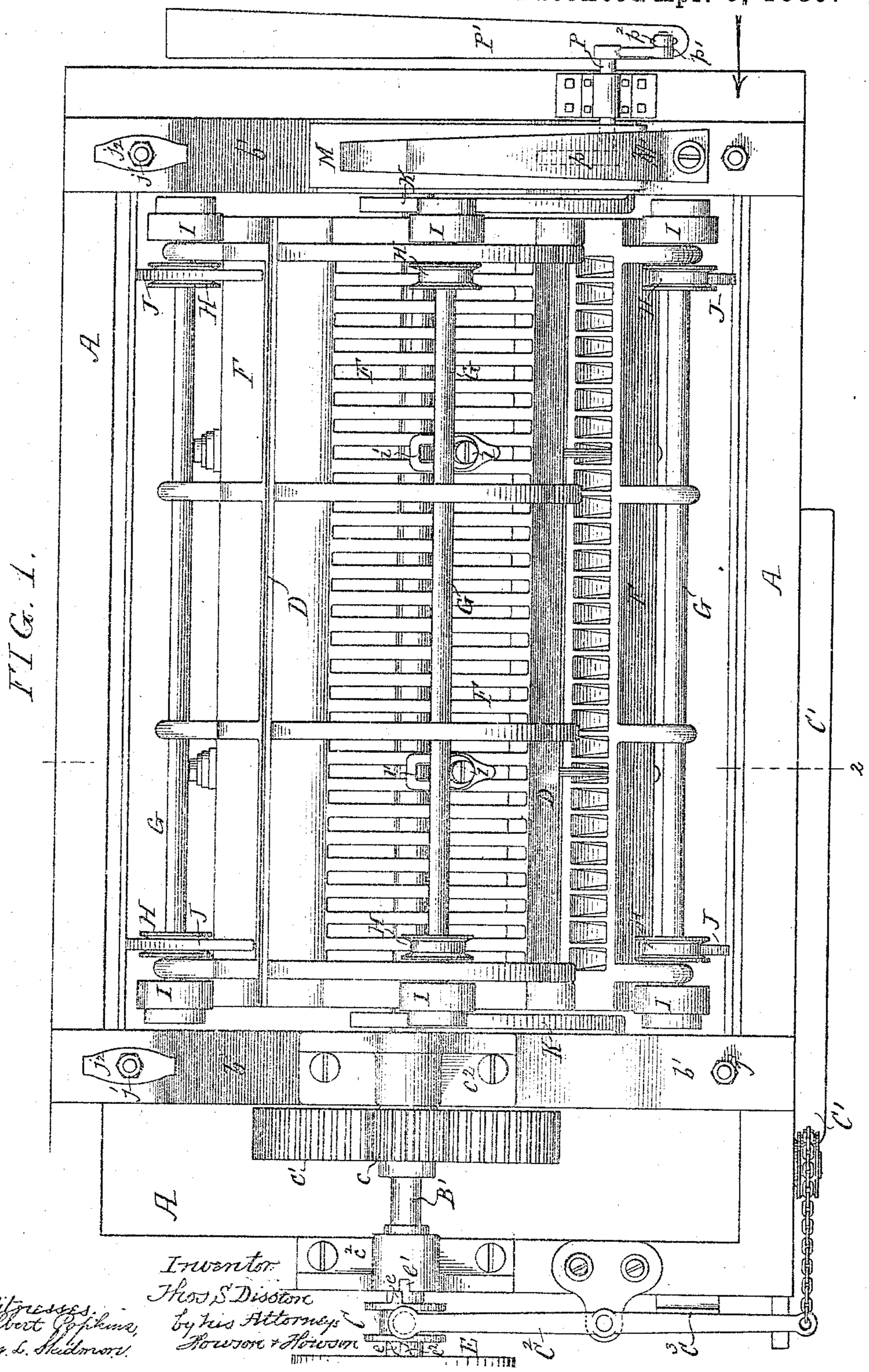

FIG. 1.

Witnesses:
Albert Jopkins,
Jas. L. Stidmore.

Inventor:
Thos. S. Disston
by his Attorneys
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(No Model.) 2 Sheets—Sheet 2.

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FIG. 2.

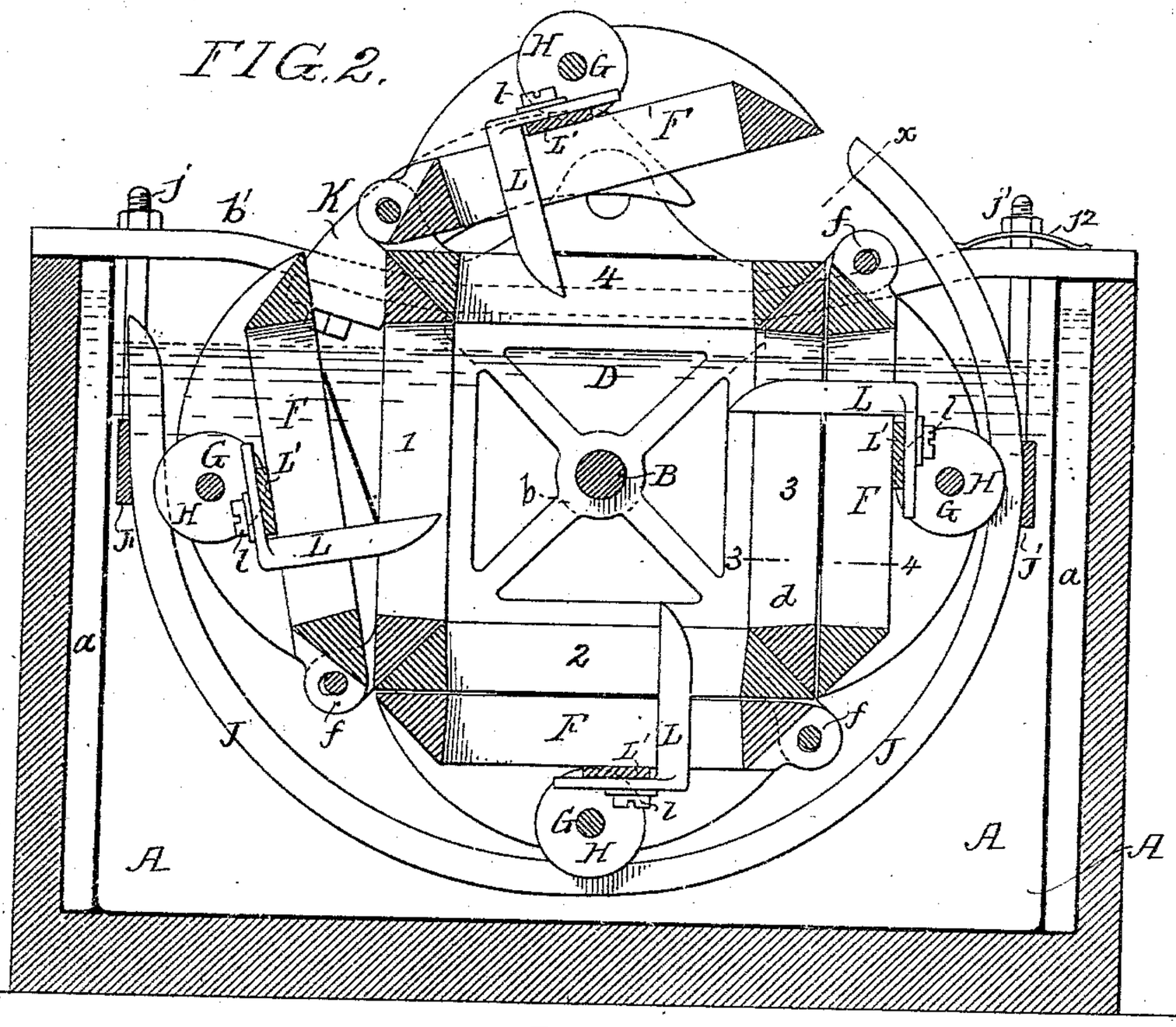

FIG. 3.

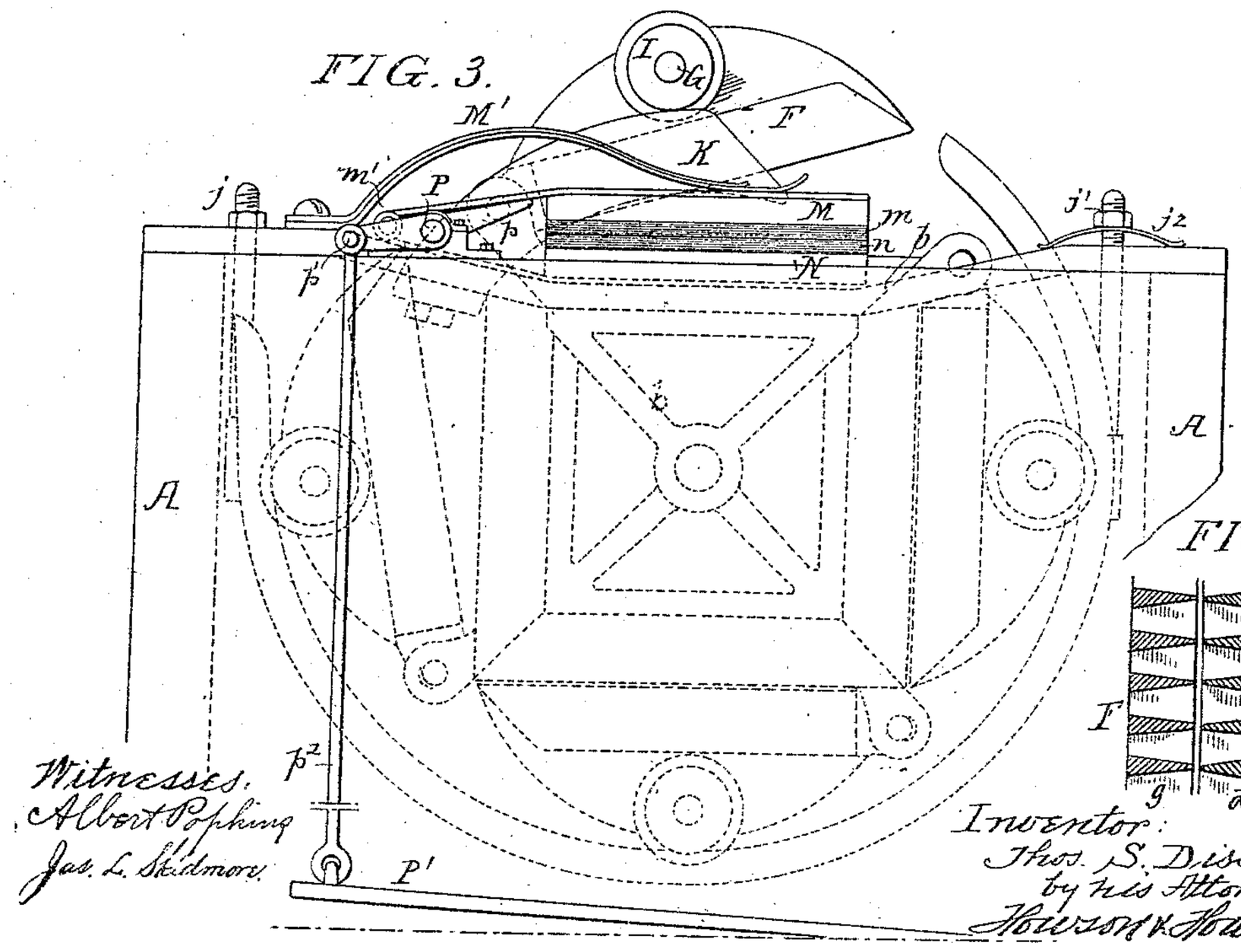

FIG. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

THOMAS S. DISSTON, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR HARDENING SAW OR OTHER STEEL BLADES.

SPECIFICATION forming part of Letters Patent No. 401,138, dated April 9, 1889.

Application filed May 18, 1888. Serial No. 274,322. (No model.)

To all whom it may concern:

Be it known that I, THOMAS S. DISSTON, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improved Apparatus for Hardening Saw or other Steel Blades, of which the following is a specification.

The object of my invention is to thoroughly and quickly harden saw-blades and similar steel plates; and my invention consists in special devices by which the saw-blades are clamped and released from a revolving drum. The revolving drum and clamping devices are broadly claimed in the application filed on the 11th day of May, 1888, by Samuel T. Paul for improvements in hardening apparatus for saw-blades, &c.

In the accompanying drawings, Figure 1 is a plan view of my improved hardening apparatus. Fig. 2 is a transverse section on the line 1 2, Fig. 1. Fig. 3 is an end view looking in the direction of the arrow, Fig. 1; and Fig. 4 is a section on the line 3 4, Fig. 2.

It is necessary in hardening saws to keep the saw in the oil or other hardening-liquid a certain length of time and under pressure in order to prevent the saw-blades from buckling while in the liquid. The common apparatus for doing this consists of a grating suspended so as to be dipped into a tank of oil. On this grating is secured a supplemental grating, which is clamped by hand to the carrying-grating. The operation of fastening the saw-blade in the clamps and then dipping the clamps in the oil occupies considerable time, as only one saw at a time can be hardened, and the price obtained for the saws does not warrant the giving of sufficient time to thoroughly harden the saws by this operation I overcome this objection by the devices which I will now proceed to describe.

A is the tank, filled, as shown in Fig. 2, to a suitable depth with oil or other hardening-liquid, and surrounding this tank is a water-jacket, *a*, to keep the oil as cool as possible.

B is a shaft mounted in suitable boxes, *b b*, on strips *b'*, secured to the sides of the tank, as shown in Fig. 1. On this shaft B is mounted the grated drum D, having four sides, as shown in Fig. 2. These sides I will indicate by the numerals 1 2 3 4. The shaft B is driven from the shaft B' through a pinion, *c*, and gear-wheel *c'* at one end of the machine. The shaft B' is mounted in bearings c^2 on one of the cross-bars *b'* and on the edge of the tank A.

C is a clutch-sleeve adapted to slide on but free to turn with the shaft B', and is provided with lugs *e e*, which engage with stops *e' e²*, the one on the bearing c^2 and the other on the driving-pulley E. This clutch is operated by a treadle, C', through the medium of a clutch-lever, C^2, pivoted to the tank A. A spring, C^3, tends to keep the clutch-sleeve C always engaged with the bearing c^2, and consequently prevents the shaft B' from turning; but by depressing the treadle C' the clutch-sleeve is thrown in gear with the driving-pulley E and out of the notch in the bearing c^2; but as soon as the foot is removed from the treadle the spring C^3 forces the clutch back to its original position.

The sections 1 2 3 4 of the drum D are made up of a series of three-cornered bars, *d*, (shown in cross-section in Fig. 4,) with spaces between the bars for the passage of the oil. The movable grids F are pivoted at *f* to each corner of the quadrangular drum D, and these grids are provided with bars *g*, similar in form to the bars *d* of the sections above referred to, and are situated opposite said bar, so that when the saw-blade is placed between the two grids and clamped thereto the edges of the said grids will clamp the blade, taking up very little of the surface of the blade, so that the oil can penetrate to all portions of the saw-blade, and the blade will consequently be hardened evenly and at the same time be held firmly in position to prevent buckling. The hinged grids F are opened and closed automatically and are held closed while they are submerged in the oil by the following devices: On the back of each grid is a shaft, G, and mounted on this shaft are flanged rollers H H and rollers I I, both preferably loose on the shaft. The shaft need not extend the full length of the machine, as shown, but can be discontinued in the middle, if necessary. The flange-rollers H H are in line with cams J J, extending, as shown in Fig. 2, two-thirds of the way around the cylinder and connected

together by longitudinal bars J′ and hung to cross-bars b' at one side by bolts j and at the other side by bolts j'. Springs j^2 are interposed between nuts on these bolts and the cross-bars b' to allow the cam to yield to accommodate the various thicknesses of blades and to prevent as much as possible the jamming of the saw-blade and the consequent breaking of the parts of the machine. The cams J are so formed that when the different sections are in position, as shown in Fig. 2, the hinged grid F of section 1 will be open and the grid of the section 2 closed, as will also the grid of the section 3, while the cam has lost control of the grid of section 4, which is raised to the position shown by cams K K acting on the rollers I I, to allow for the removal of the hardened saw-blade.

L are adjustable stops adapted to be clamped to bars L′ on the back of each grid F. These stops extend through the grid F and into the grids of the drum D and are adjustably secured in position by means of a set-screw, l, adapted to a slot, l', in the stop L. By this means the stops can be raised or lowered to accommodate saw-blades of different widths. The stops L may be secured in a similar manner to the drum itself without departing from my invention.

On one of the cross-frames is mounted a spring clamp-block, M, having a cleaning-surface, m, and under this clamp-block is a block, N, having a cleaning-surface, n. This clamp-block M is hinged at m' to the cross-bar b', and a spring, M′, also secured to the cross-bar, bears upon said block M. The object of this block is to remove as much as possible the oil from the saw-blade after it has been hardened by being passed through the oil.

The block N is raised by means of a pawl, p, on a rock-shaft, P, having its bearings on the tank A and having an arm, p', connected to a treadle, P′, through the medium of a connecting-rod, P^2. By pressing upon the treadle P′ the clamp-block M is raised, and when the treadle is released the spring M′ forces the block M down upon the block N.

The operation of this machine is as follows: The apparatus is so situated in respect to the hardening-furnace that the attendant can insert the heated blade to be hardened into the open jaw, as shown at 1, Fig. 2, immediately upon its removal from the furnace. As soon as the blade is inserted in the jaw the attendant places his foot upon the treadle C, which throws in gear the operating mechanism of the machine, and consequently the drum carrying the blade is revolved. The operator then removes his foot from the treadle before the cylinder makes a full quarter-turn, so that the lug e on the clutch will be forced into the recess e' on the bearing c^2, and consequently stop the rotation of the cylinder at the proper point. In the meantime the jaw F of the section 1 has been closed by the cam J and the blade is held tightly between the grids. In the meantime another blade is inserted in the open jaw, which has been opened during the quarter-turn, and the above-described operation is repeated. When the jaws reach the point X, Fig. 2, they are released by the cam J and opened by the cam K, as shown in connection with the section 4 of the drum. Another attendant inserts a pair of tongs between the jaws and places his foot upon the treadle P′, raising the clamp-block M. The saw-blade of the section 4 is then inserted between the clamp-block M and the block N. The attendant then releases his hold on the treadle, allowing the clamp-block M to press upon the blade. The saw-blade is then drawn through the jaws formed by the blocks, the cleaning-surfaces m and n removing the oil from the blade. This work is done simultaneously with the insertion of the new blade from the furnace into the jaws of the drum.

By the devices above described while one blade is being hardened another one is being placed in position, and at the same time a third blade is being removed from the apparatus.

It will be understood that I do not limit myself to a quadrangular drum having four grids, as more or less than four may be used without departing from my invention.

I claim as my invention—

1. The combination of the tank containing hardening-liquid, a drum provided with stationary and movable grids, with cams encircling a portion of the drum and acting to clamp the movable grids to the drum while said grids are in the hardening-liquid, and cams for raising the movable grids when they emerge from the liquid, substantially as described.

2. The combination of the tank, the drum formed of a series of grids with a series of grids pivoted thereto, cams encircling a portion of the drum and acting to close the jaws formed by said grids, and fixed cams with which projections on the pivoted grids engage to open said jaws when they reach a position above the liquid in the tank, all substantially as specified.

3. The combination of the drum and means for rotating the same, said drum having a series of grids forming jaws adapted to be opened and closed automatically, with a cleaning-block and a treadle connected thereto to raise said block, so that a hardened blade may be passed from the grids under the cleaning-block when the jaws release said blade, substantially as and for the purpose set forth.

4. The combination of the tank and a drum carrying a series of jaws with a cam encircling a portion of said drum for closing the jaws, said cam having a yielding support at one or both of its ends, substantially as specified.

5. The combination of the movable grids

with an adjustable stop or stops secured to one of said grids for supporting the saw-blade, substantially as described.

6. The combination of the tank, a drum composed of a series of grids, a series of grids or frames pivoted thereto, with rollers carried by each movable grid, and an annular cam acting upon said rollers to clamp the grids together, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOS. S. DISSTON.

Witnesses:
WILLIAM D. CONNER,
HENRY HOWSON.