

(No Model.)

2 Sheets—Sheet 1.

T. W. HARDIE.  
STONE SAWING MACHINE.

No. 250,807.

Patented Dec. 13, 1881.

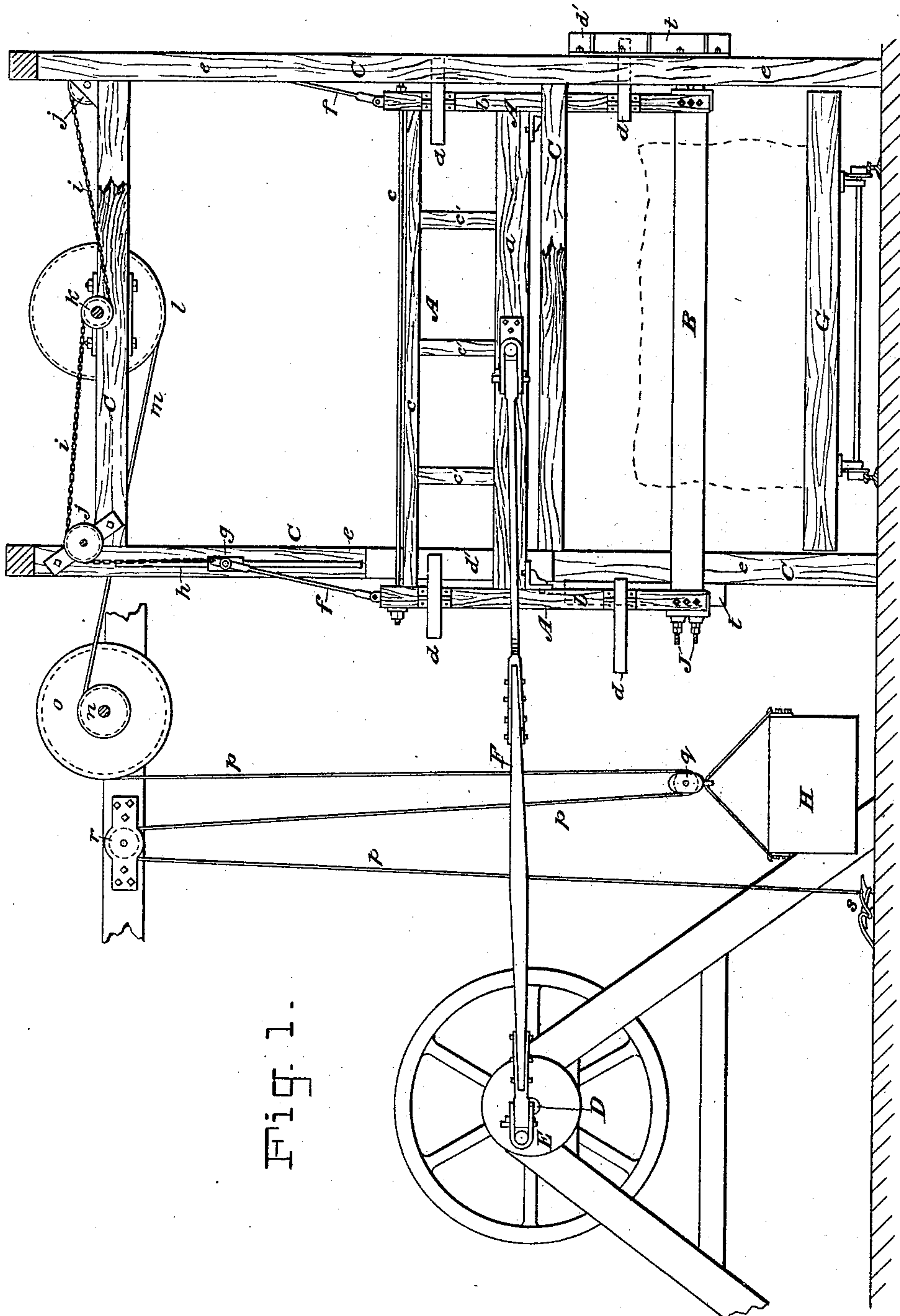


Fig. 1.

INVENTOR:

WITNESSES:

*E. B. Bolton*

*Geo. Baindon*

*Thomas W. Hardie*

By his Attorneys,

*Burke, Brainerd & Bennett*

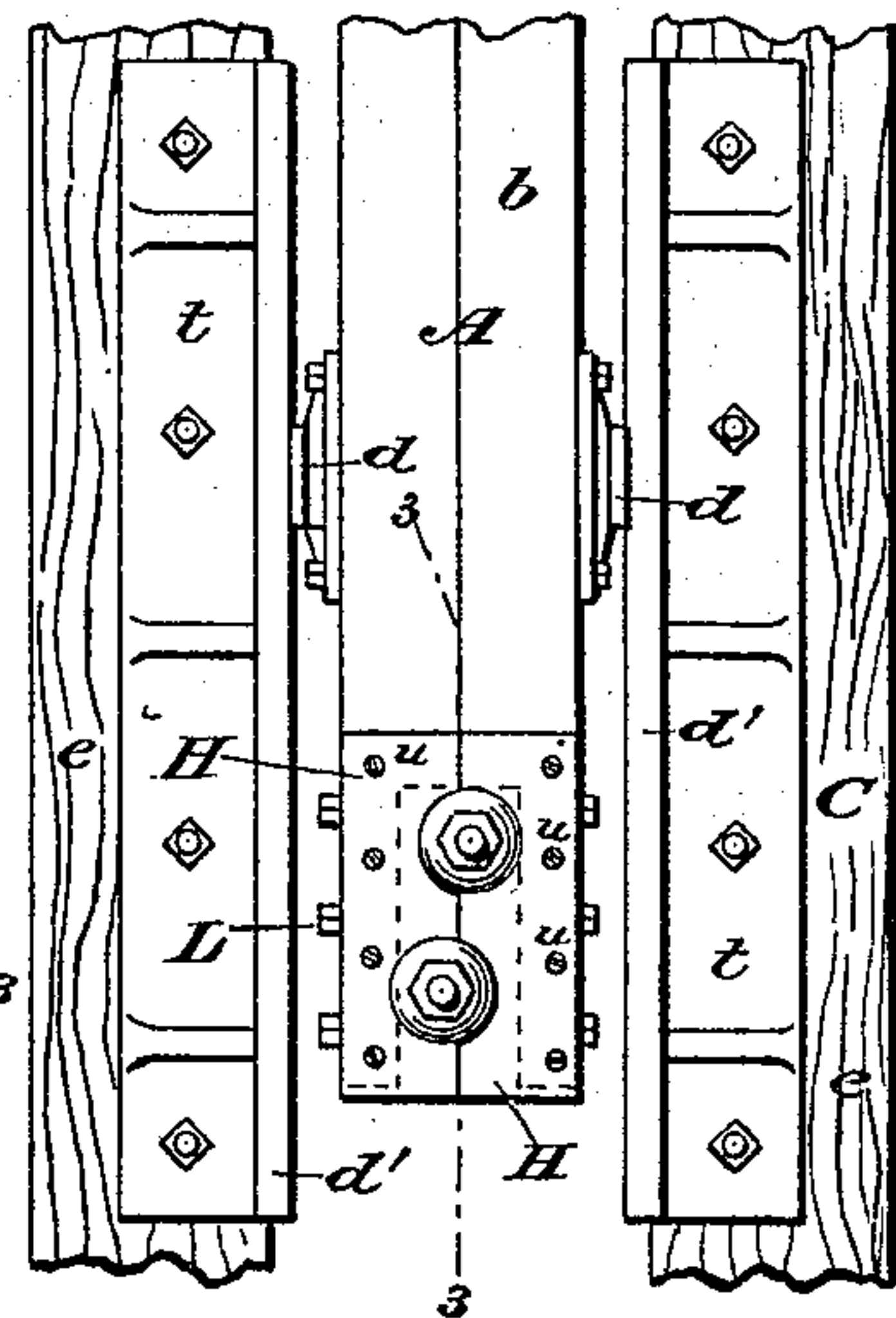
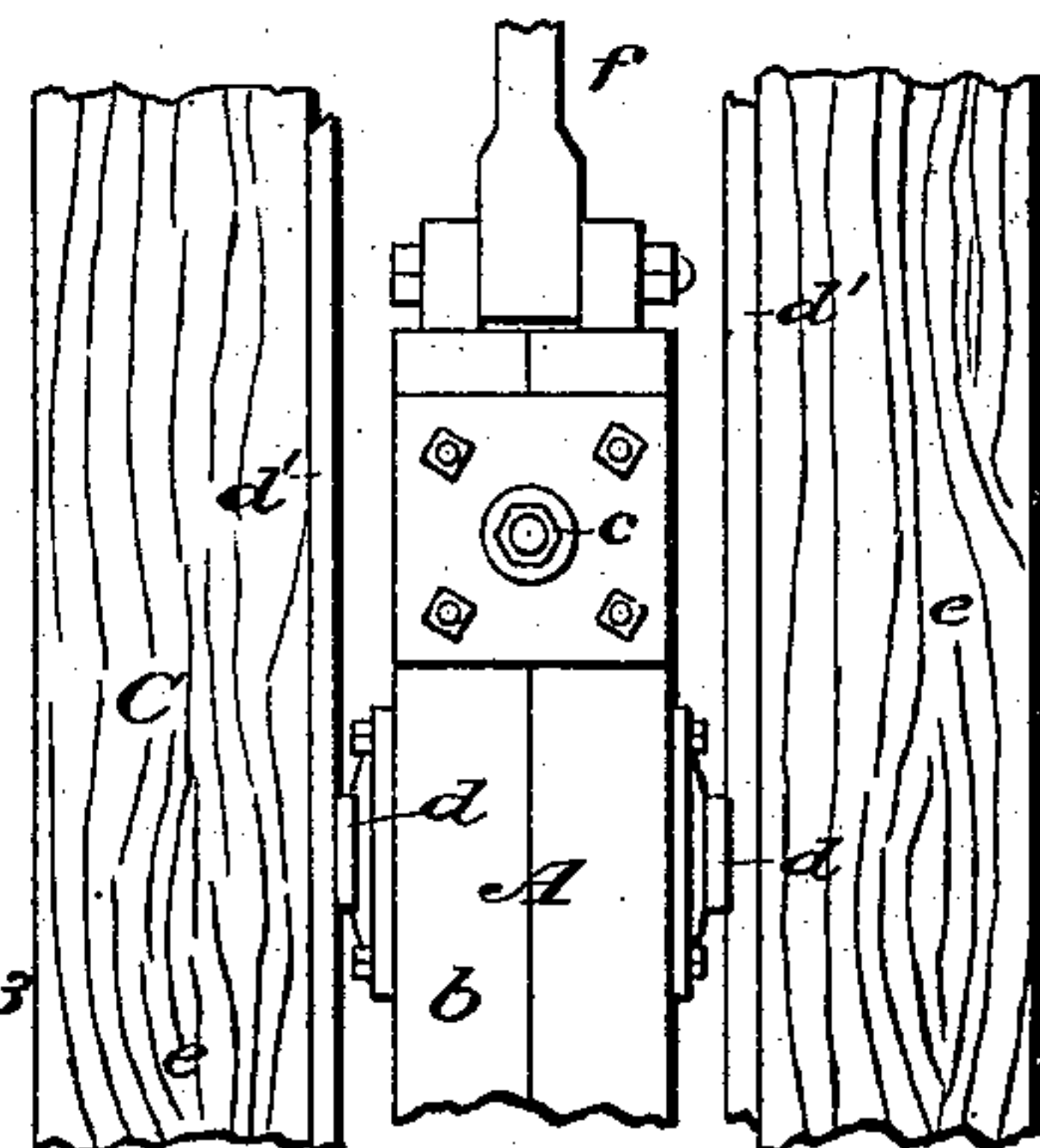
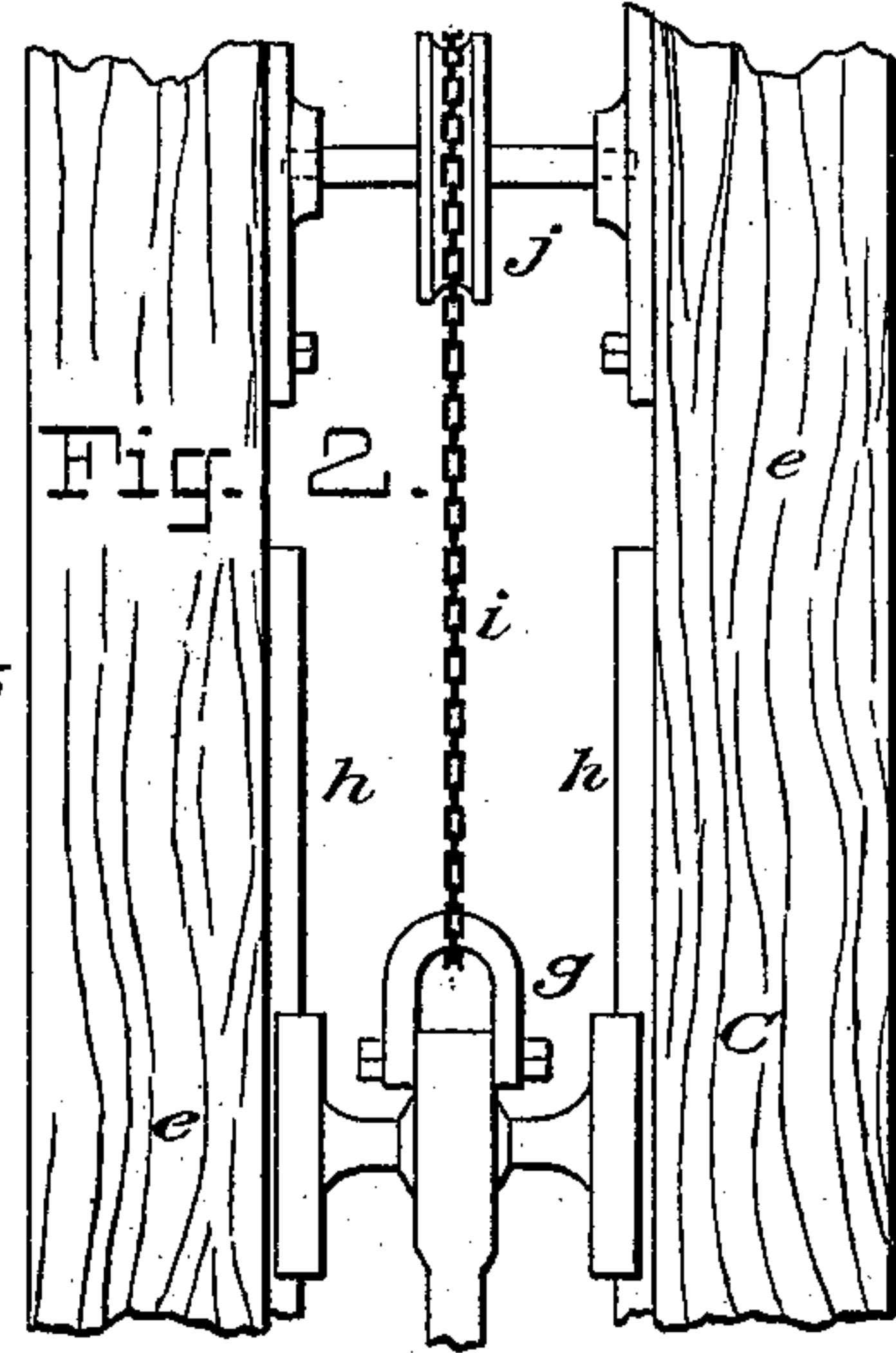
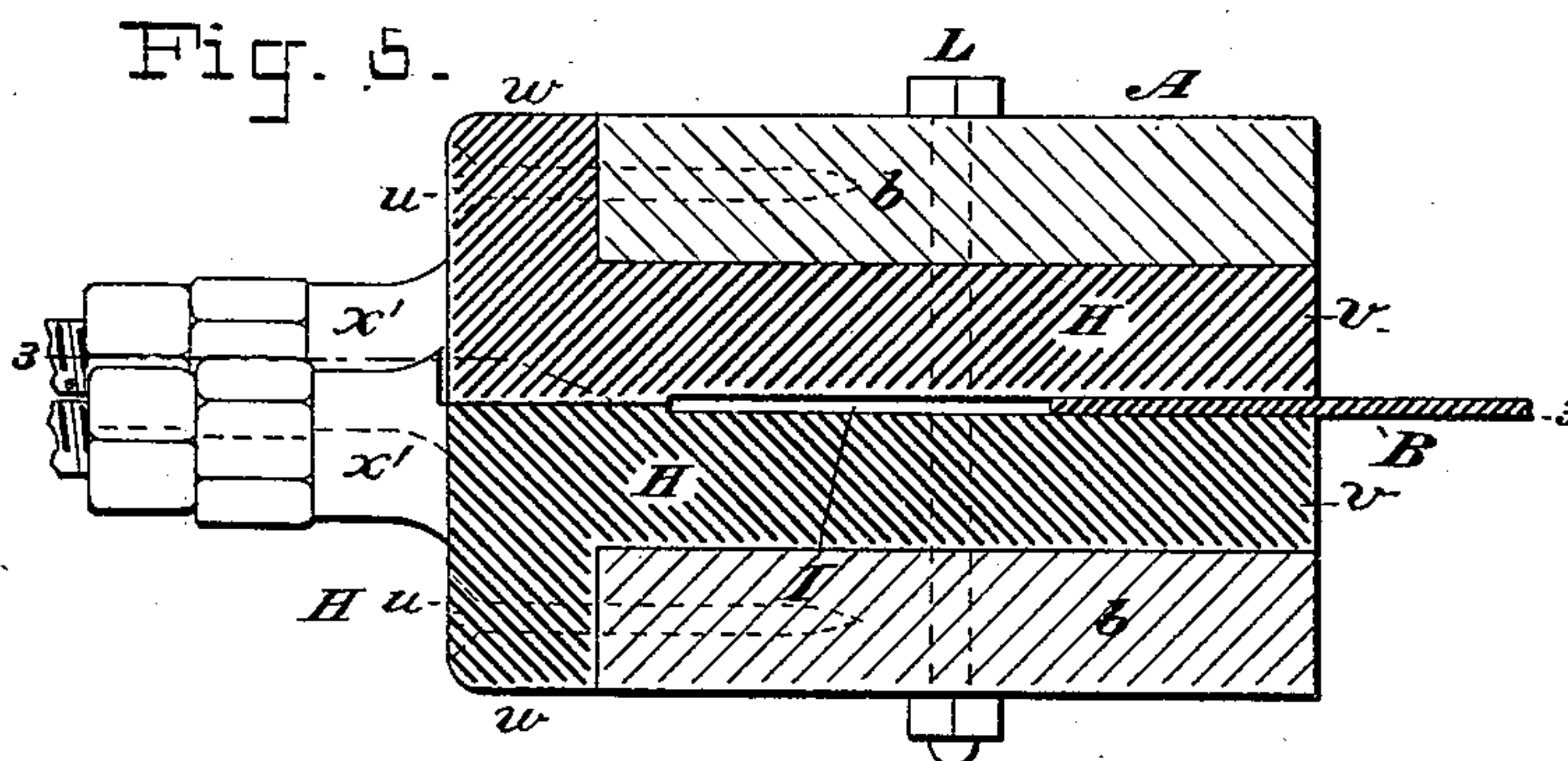
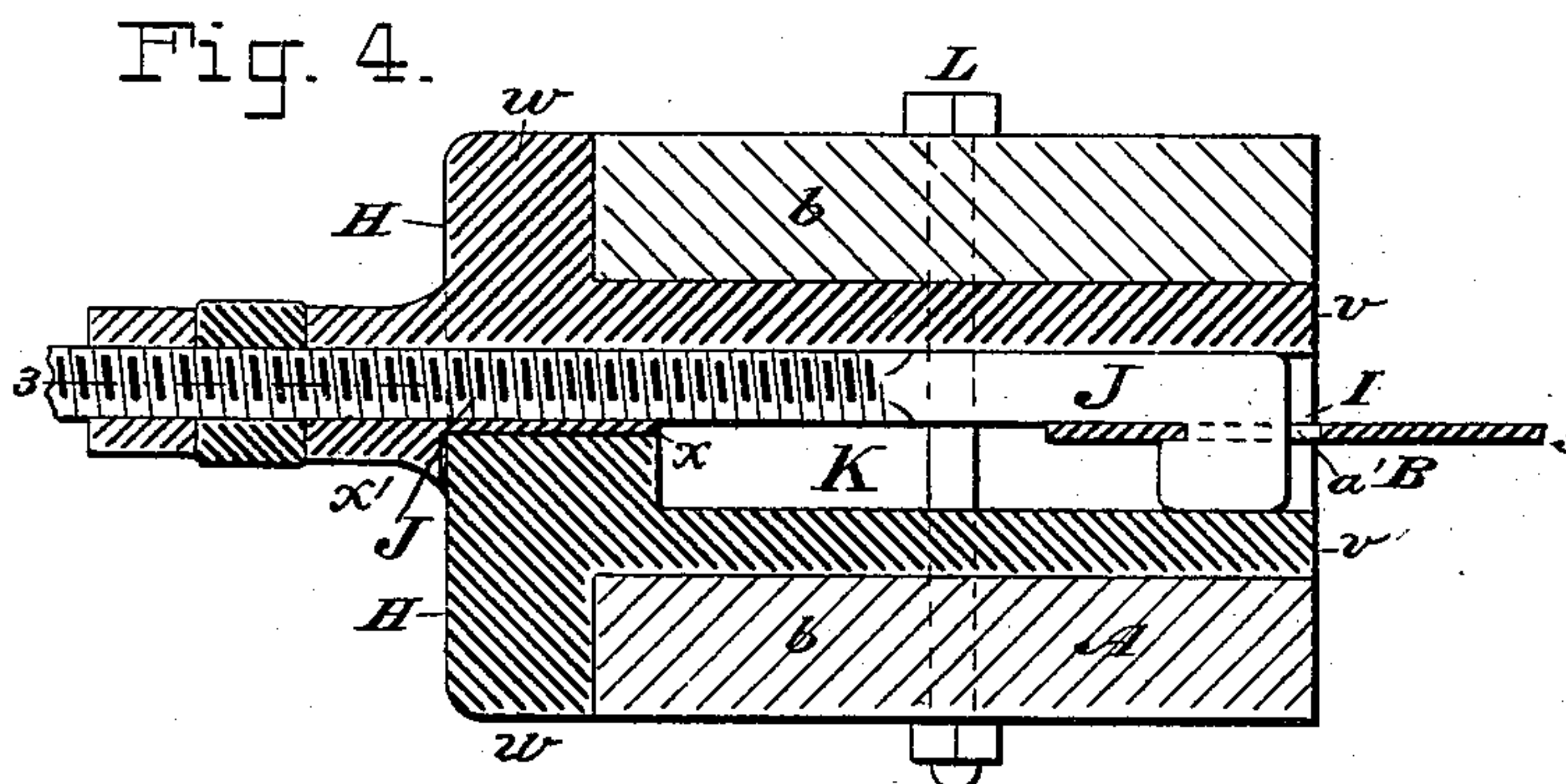
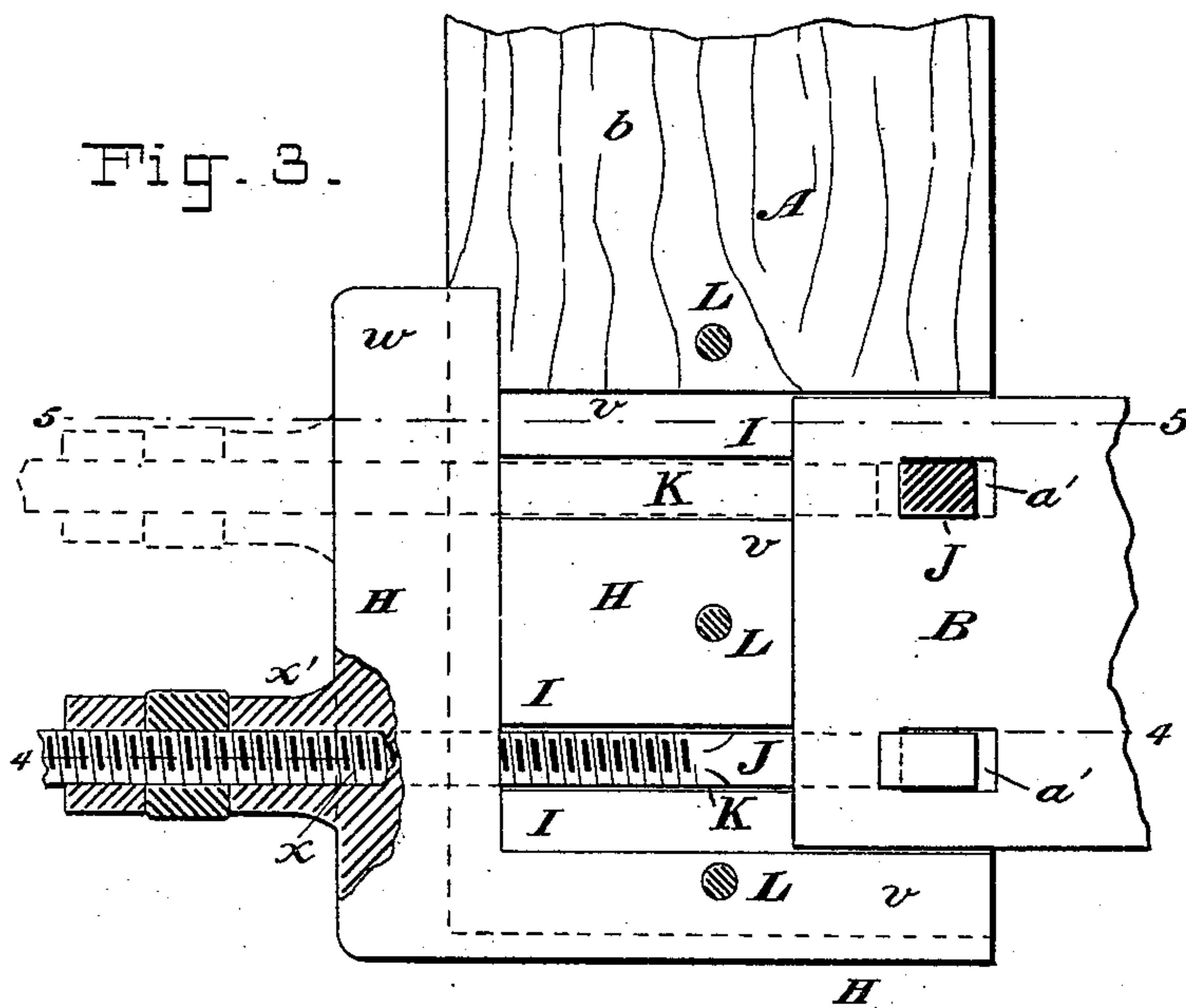
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2 Sheets—Sheet 2.

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E. B. Bolton

Geo. Dainton

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Burke, Fraser & Bennett



# UNITED STATES PATENT OFFICE.

THOMAS W. HARDIE, OF NEW YORK, N. Y.

## STONE-SAWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 250,807, dated December 13, 1881.

Application filed September 30, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS W. HARDIE, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Stone-Sawing Machines, of which the following is a specification.

This invention relates to the construction of stone-saws using chilled-iron shot as the cutting-substance, although the improvements are applicable, in part, to diamond and other saws.

In the accompanying drawings, Figure 1 is a side elevation of my machine, part of the guiding-frame of the saw being broken away. Fig. 2 is a fragmentary end view on a larger scale. Figs. 3, 4, and 5 are detail views, on a still larger scale, showing the means of attaching the ends of the saw-blade to the frame, Fig. 3 being a vertical mid-section cut in the plane of lines 3 3 in Figs. 2, 4, and 5, and looking in the same direction as Fig. 1, and Figs. 4 and 5 being horizontal sections taken respectively in the planes of the lines 4 4 and 5 5 in Fig. 3.

Like letters of reference designate like parts in all the figures.

Referring principally to Fig. 1, A is the saw-frame holding the steel saw-blade B, and confined within a standing frame, C.

D is the driving-shaft, having a crank, E, connected by a pitman, F, to the frame A, whereby the latter is reciprocated.

The frame A consists chiefly of a horizontal strut-bar, *a*, vertical lever-bars *b b*, and a tie, *c*, after the manner of rip-saw frames generally.

I make the tie *c* a metal tie-rod, in connection with a tie-bar, and I connect the tie-bar to the bar *a* by vertical bars *c' c'*, thus stiffening the frame.

To each side of each bar *b* are fixed two guiding-bars, *d d*, one near the top and the other near the bottom. These are preferably of metal, standing off somewhat from the surface of the bars, and extending horizontally a distance approximately equaling the stroke of the saw.

The standing frame C consists, essentially, of four vertical posts, *e e*, two at each end of the saw-frame, and those of each pair set just sufficiently far apart to receive the saw-frame and its guiding-bars *d d* between them, as shown in Fig. 2, thus serving to retain the saw-frame in the proper vertical position. The guiding-bars *d d* bear against the inner surfaces of the

posts *e e*, or preferably against metal plates or castings arranged to form a protecting-facing therefor. (Shown at *d' d'* in Fig. 2.)

Prior to my invention the saw-frame has been guided by contact of its upper and middle bars with two pairs of upright bars, between which it reciprocates. This construction necessitates the pairs of upright guiding-bars being set closer together than the length of the saw-frame, thereby reducing the size of the stone which the machine will saw, and it also necessitates placing the upright bars as close together as the thickness of the upper and middle bars of the saw-frame, so that no space is left between the saw-frame and the uprights, which in practice is inconvenient. Furthermore, the lower guiding-point cannot be nearer to the saw-blade than the middle bar, whereas it is desirable that it be placed as near the blade as possible. By placing my guiding-bars *d d* on opposite sides of the bars *b b* of the saw-frame I secure the desired room between that and the uprights of the standing frame, and also am able to place my lower guides at any desired point below the middle bar, *a*.

The stone to be sawed (shown in dotted lines in Fig. 1) is placed on a table or car, G.

The frame A is supported somewhat in the usual manner. Connecting-rods *f f* are jointed to the tops of the bars *b b* and extend thence upward to cross-heads *g g*, sliding in vertical guides *h h*, (Fig. 2,) to which cross-heads the upper ends of the rods *f f* are jointed. The cross-heads are suspended by chains or ropes *i i*, which pass over stationary sheaves *j j* mounted at the upper part of the frame C, and both wind in the same direction upon a single windlass or drum, *k*, to the shaft of which is fixed another larger drum, *l*, on which the end of a rope, *m*, is wound in the opposite direction to that in which the chains *i i* are wound on the drum *k*. Thus when the rope *m* unwinds the chains *i i* are wound up, and vice versa. The other end of rope *m* is fixed to and wound on a drum, *n*, to the shaft of which is fixed another larger drum, *o*, on which the end of another rope, *p*, is wound in the opposite direction to that in which the rope *m* is wound on the drum *n*. From the drum *o* the rope *p* is carried down, rove through a block, *q*, carried thence up over a sheave, *r*, and carried thence down to a cleat or other holdfast, *s*.



From the block *g* is suspended a heavy weight, *H*, whose strain tends to lift the saw-frame *A*, acting at a considerable mechanical advantage in consequence of the interposition of unequal drums *k l*. The weight *H* should not be sufficiently heavy, considering its purchase, to lift or counterpoise the frame *A*; but it should somewhat decrease the weight thereof to the same extent heretofore found best in sawing with chilled shot, leaving the frame a sufficient downward tendency to effect the proper percussive action in sawing and to properly feed the blade into the stone. It is usual to construct the weight *H* of a box containing stones or other heavy material that the weight may be increased or diminished at will, according to the work to be done.

Before starting the machine the saw-frame *A* is lifted until the blade *B* is above the top of the stone to be sawed, which is done by pulling down on the rope *p*. The stone, having been placed on the table *G*, is rolled underneath the saw to the desired position. The table is then wedged fast, and the frame *A* is lowered until the blade *B* rests on the top of the stone, at which time the weight *H* should be suspended just off the ground, which is accomplished by taking up more or less of the rope *p* at *s*. A windlass may be provided as the take-up *s*, instead of a cleat, with advantage. Chilled shot and water being then supplied to the blade, the machine is started. The action of the blade and shot upon the stone is the same as in other saws using chilled shot, and the saw-blade gradually feeds itself down through the stone. As the saw-frame descends the weight *H* rises, its ascent being more rapid than the descent of the frame to the extent of its purchase or mechanical advantage thereover. When the weight *H* has risen until the block *g* is close to the sheave *r* it is necessary to drop it in order that the saw-frame may continue its descent. This is done by disengaging the rope from the holdfast *s* and paying it out until the weight is let down nearly to the ground, and then again fastening the rope.

Heretofore in saws having a gravity-feed the rope *m* has been carried down over a sheave, and the weight has been attached directly to its end. With this arrangement, when the weight has been drawn up to the sheave a man must climb up, untie it, drop it down lower, and again tie it to the rope—an operation of considerable difficulty and causing great loss of time; or else a much greater vertical space for the weight to move in must be provided, which is a matter of much expense, and in many situations is impracticable; or else the purchase must be decreased and a much heavier weight used, which increases the difficulty of handling and adjusting the weight. By my arrangement the weight may be raised and lowered with comparative ease, a purchase of two to one being secured by the use of the block *g* for facility in manipulating the weight, and this is compensated for by the purchase due to the interposition of the drums *n o*.

It will be observed by reference to Fig. 1 that the upper guides *d* project on both sides of the bars *b b*, while the lower ones project only outwardly or from each other. This is to admit of the sawing of as large a stone as heretofore, as it is evident that if the lower guides were like the upper ones the extent of their projection past the bars *b b* toward each other would narrow the clear space for the stone between them. The lower guides *d* being thus farther separated than the upper ones, it is necessary that the plates or surfaces *d'*, against which they work, must be likewise separated, in order that at extreme stroke the guides may not pass beyond them. For the upper guides the plates *d'* are mere flat plates fixed against the inside surfaces of the posts *e*; but for the lower ones I provide angle-irons or flanged castings *t t*, Figs. 1 and 2, the base-plate or flange of each of which is bolted against the front side of each of the two front posts *e* and against the rear side of each of the rear posts, the other plate or flange thereof forming the plate or surface *d'*.

I will now describe my fastening for the ends of the saw-blade.

The lever-bars *b b* are made preferably of two pieces fastened side by side, with the joint between them in the center, as shown in Fig. 2. Fig. 3 is a section of the lower portion of one of these bars cut through this joint. At the bottom end of the bar *b* the contiguous faces of the two pieces are cut out, as shown in dotted lines in Fig. 2, and into the mortise thus formed two castings or metal fittings, *H H*, are placed, one of them being fastened to each half-bar *b* by screws *u u*, Figs. 2 and 5.

Each casting *H* consists of an inside plate, *v*, which projects into the mortise in the bar *b*, a front flange, *w*, which lies against the front surface thereof, and through which the screws *u* pass, and, by preference, a bottom flange, Figs. 1 and 2, covering the bottom end of the bar *b*. When the two castings are in place and the two half-bars *b* are fastened together a space or socket, *I*, Fig. 5, is left between the two inside plates, *v v*, barely wide enough for the reception of the end of the blade *B*. The blade *B* has two holes, *a' a'*, near its end, into which may be hooked the ends of two hook-bolts, *J J*, they being reversed or applied from opposite sides of the blade. The screw-threaded shanks of these bolts *J* pass through holes *x x* in the castings *H H*, one hole being formed in each casting to coincide with the positions of the bolts on opposite sides of the saw-blade. These holes *x x* extend from the socket *I* forward through the castings, a boss, *x'*, being formed at the termination of each hole.

In each side of the socket *I* a channel, *K*, is formed as a continuation of the hole *x*, the two channels forming a socket in which the hooked ends of the bolts may freely slide back and forth. The above description is literally that of the provisions on the front bar *b*, but those on the rear bar are of the same construction.

The blade is inserted thus: The hook-bolts



J J are inserted from the rear into the castings H H of the front bar *b*, their hooked ends projecting out at the rear thereof. The forward end of the saw-blade is brought up and engaged with the hooks. The hooks are then drawn back, the end of the blade being thus drawn into the socket I, and to the extreme end of the socket, (the bolts L L not yet having been put in.) The blade being thus drawn forward, its rear end may be connected in like manner with the hooks at the rear bar *b*, whereupon that end is drawn nearly half-way into the socket I in the rear bar, thus drawing it nearly half-way out of the front socket. Nuts are then screwed onto the projecting ends of the bolts J J at front and rear, thereby straining the saw-blade tightly. The blade may possibly, after being thus strained, incline slightly to either side or have a slight twist or wind. This I correct by inserting transverse bolts L L and tightening their nuts, thereby drawing the two castings H H closely together and narrowing the socket I, so that its walls close against and tightly confine the blade, thereby straightening and truing the latter.

The blade may be tightened from time to time by loosening the bolts L L, screwing up the nuts on the hooked bolts J J, and again tightening the bolts L L, the tension of the frame A being maintained by the tie-rod *c*.

Two or several blades may be set in the frame A instead of one, if desired, and in place of the purchase by unequal drums *k l* and *n o* a block-tackle purchase may be employed.

I claim as my invention—

1. The combination, to form a stone-sawing machine, of a suspended saw-frame, A, consisting of strut-bar *a*, lever-bars *b b*, tie-bar *c*, and blade B, provided with guiding-bars *d d*, fixed transversely to the bars *b b*, on opposite sides thereof, and one pair at or near the top of each bar, and the other at or near the bottom thereof, with guiding-posts *e e* and suitable means for reciprocating the frame A, substantially as set forth.

2. The combination of saw-frame A, means for reciprocating it, suspending-chains *i i*, connected to its end, sheaves *j j*, over which said chains pass, weight H, arranged to partially counterbalance said saw-frame through the

medium of said chains, and an interposed purchase-block, *q*, from which said weight depends, a rope in the pendent bight of which said block is hung, and holdfast *s* for the end of said rope, substantially as and for the purposes set forth.

3. The combination, with reciprocating saw-frame A, and means for reciprocating it, of suspending-chains *i i*, drum *k*, larger drum *l*, connected therewith, rope *m*, drum *n*, larger drum *o*, connected therewith, rope *p*, holdfast *s* therefor, block *q*, hung in the pendent bight of rope *p*, and weight H, hung from said block *q*, substantially as and for the purposes set forth.

4. An end fastening for a saw-blade, consisting of a straining bolt or bolts passed through the bar of the saw-frame and engaging the end of the blade, clamping plates or castings fixed to said bar of the saw-frame, between the faces of which the end of the blade is drawn in straining, and clamping-bolts or other equivalent means for forcing said plates together and thereby gripping the blades between them, substantially as set forth, whereby the blade may be trued after being strained.

5. The combination of bar *b*, blade B, holes *a' a'* in said blade, hooked bolts J J, adapted to hook into said holes, bolt-holes *x x*, and guiding-sockets *k k* in line with each other through said bar, and means for forcibly drawing back said hooked bolts, and thereby straining the blade, adapted to engage the shanks of said hooked bolts when the same have been passed through said holes in the bar *b*, substantially as set forth.

6. The combination of divided bar *b*, half-castings H H, each fixed in one half of said bar, holes *x x* and channels K K in said castings, hooked bolts J J, recess I, formed between said castings, clamping bolt or bolts L, and saw-blade B, formed with holes *a' a'*, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THOMAS W. HARDIE.

Witnesses:

ARTHUR C. FRASER,  
HENRY CONNETT.