No. 671,830.

Patented Apr. 9, 1901.

E. LOESSER.

DIAMOND CROSS-CUTTING MACHINE.

(Application filed May 2, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig: 1.

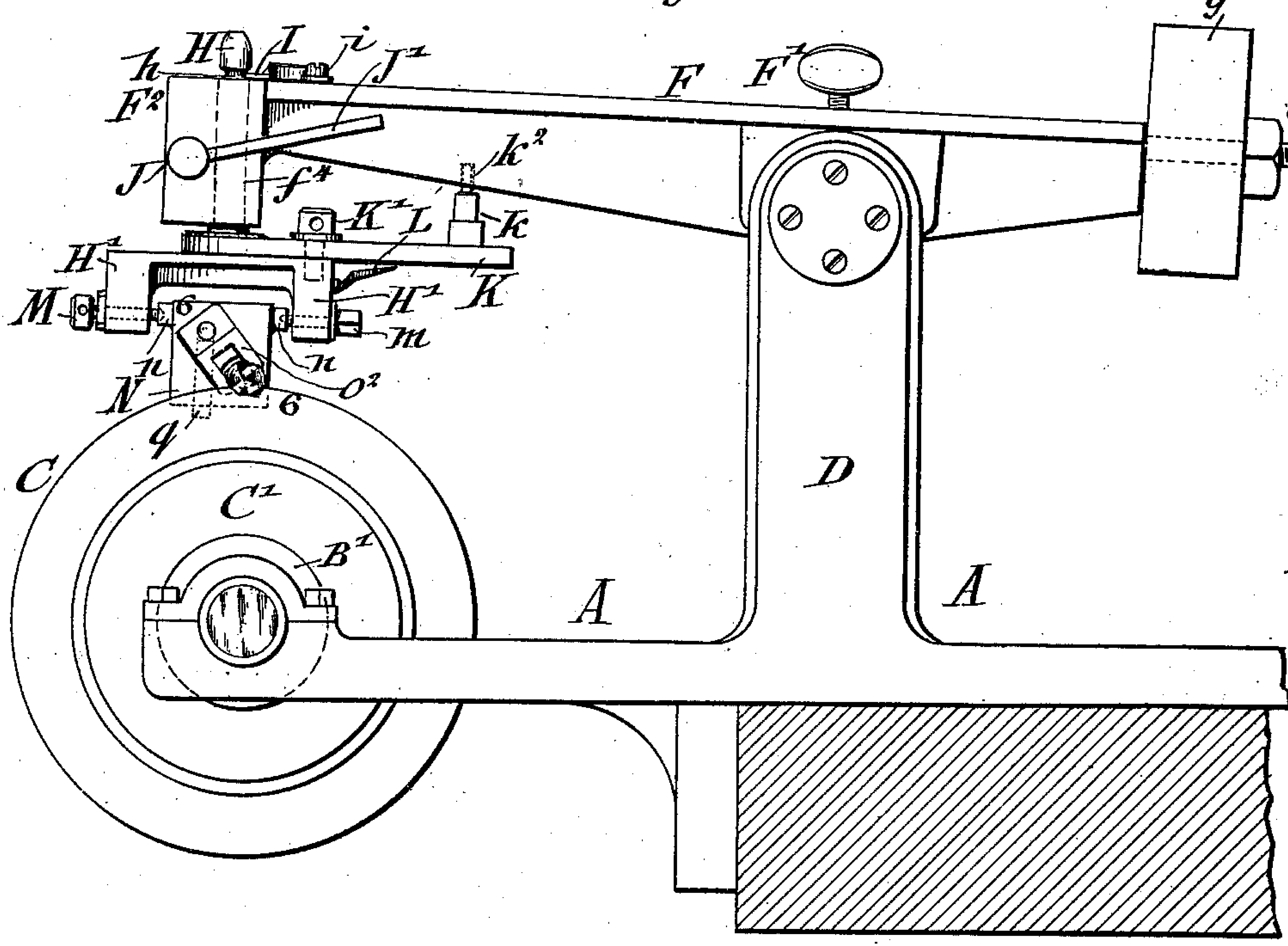

Fig: 2.

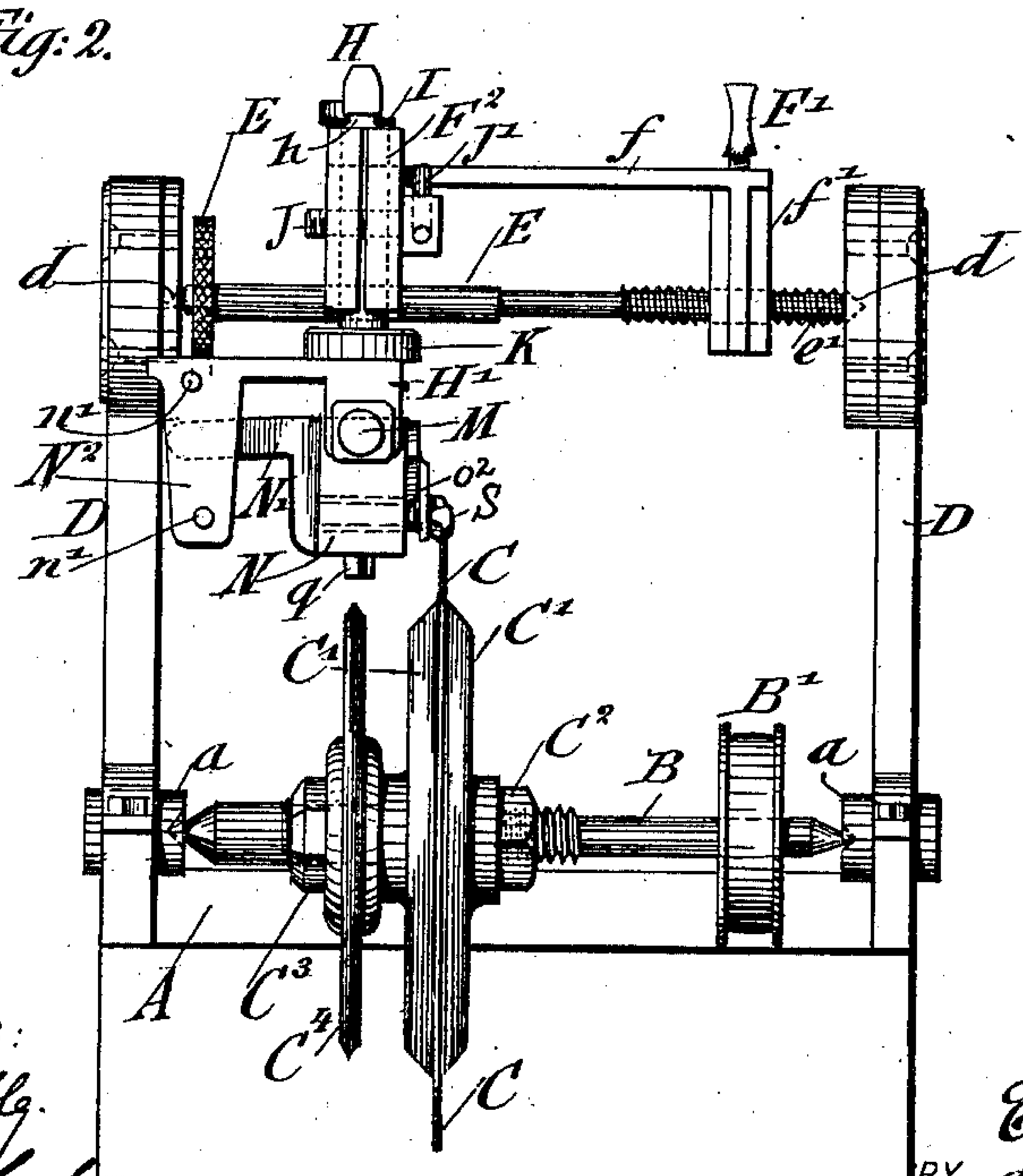

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Fig:3.

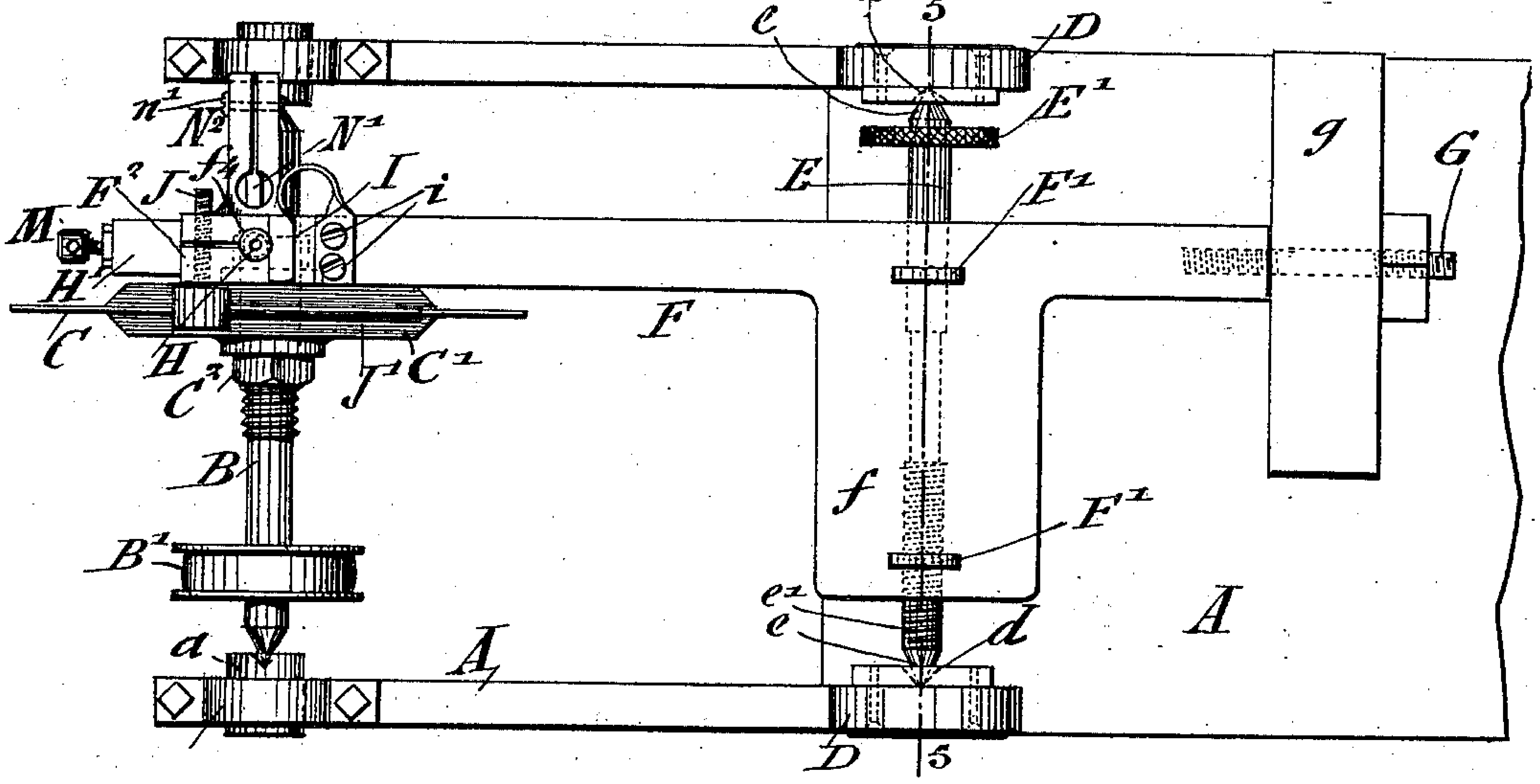


Fig:5.

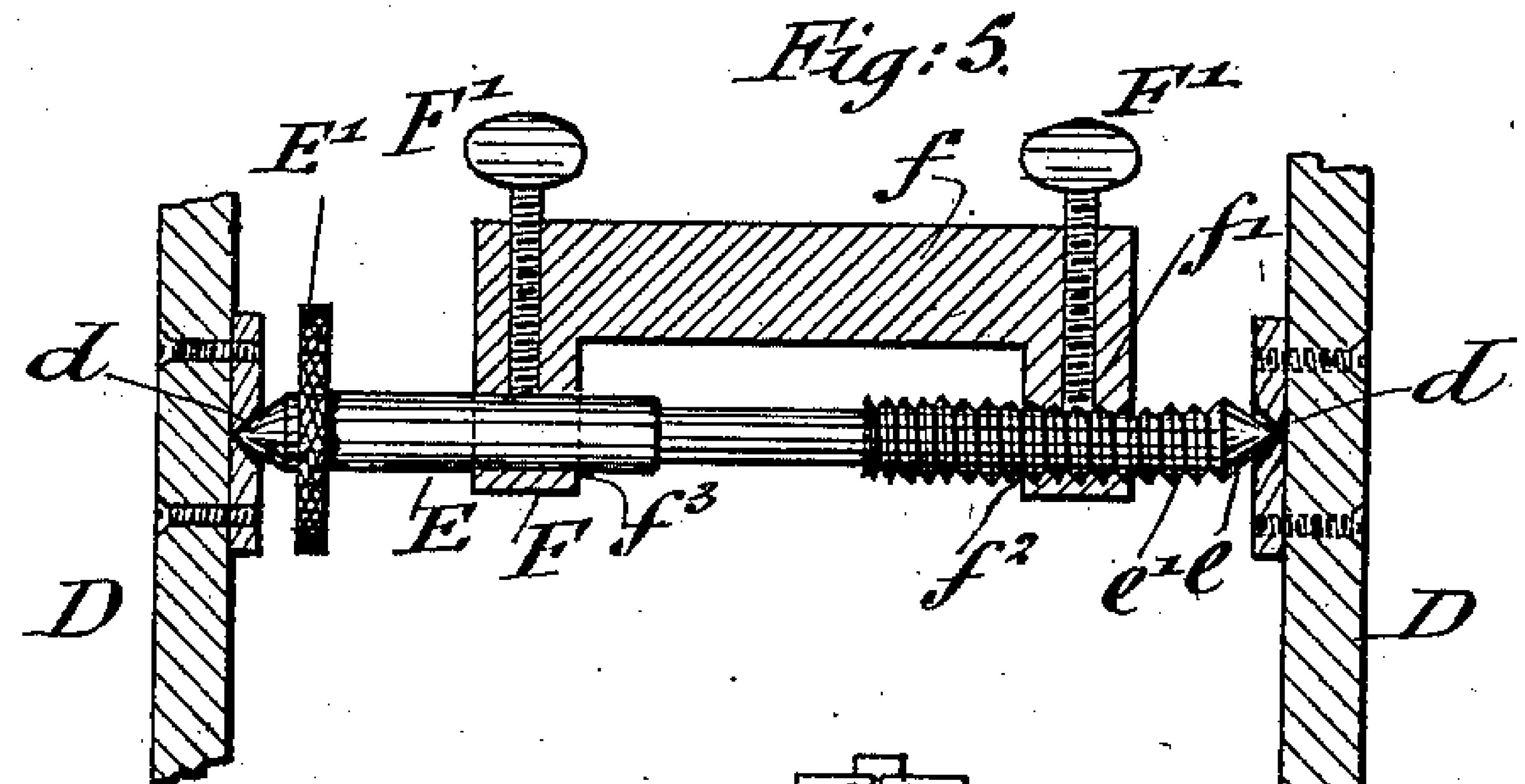


Fig:6.

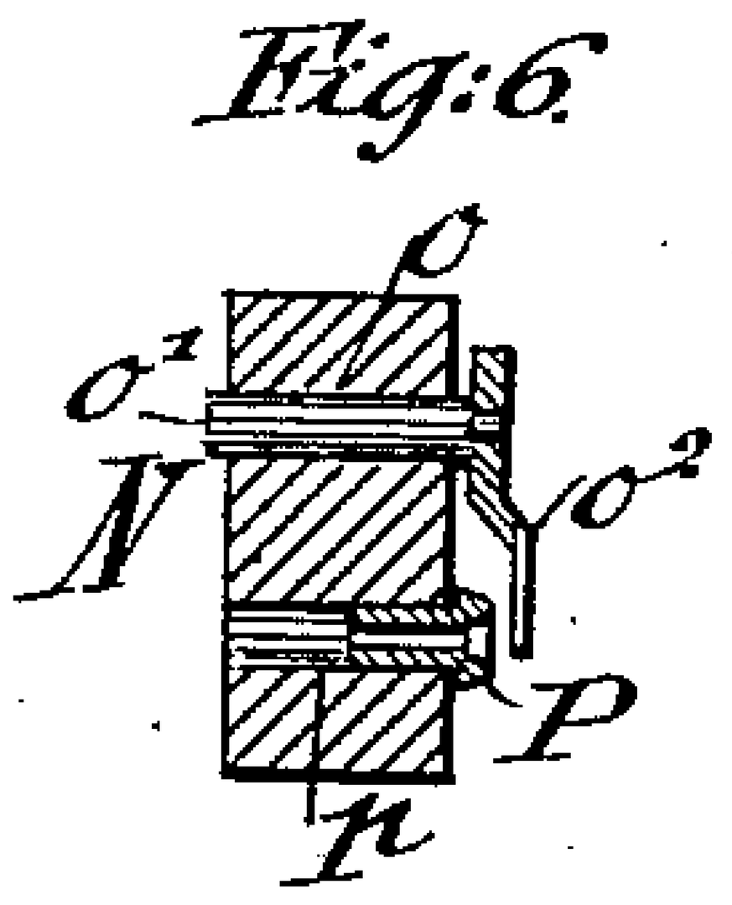
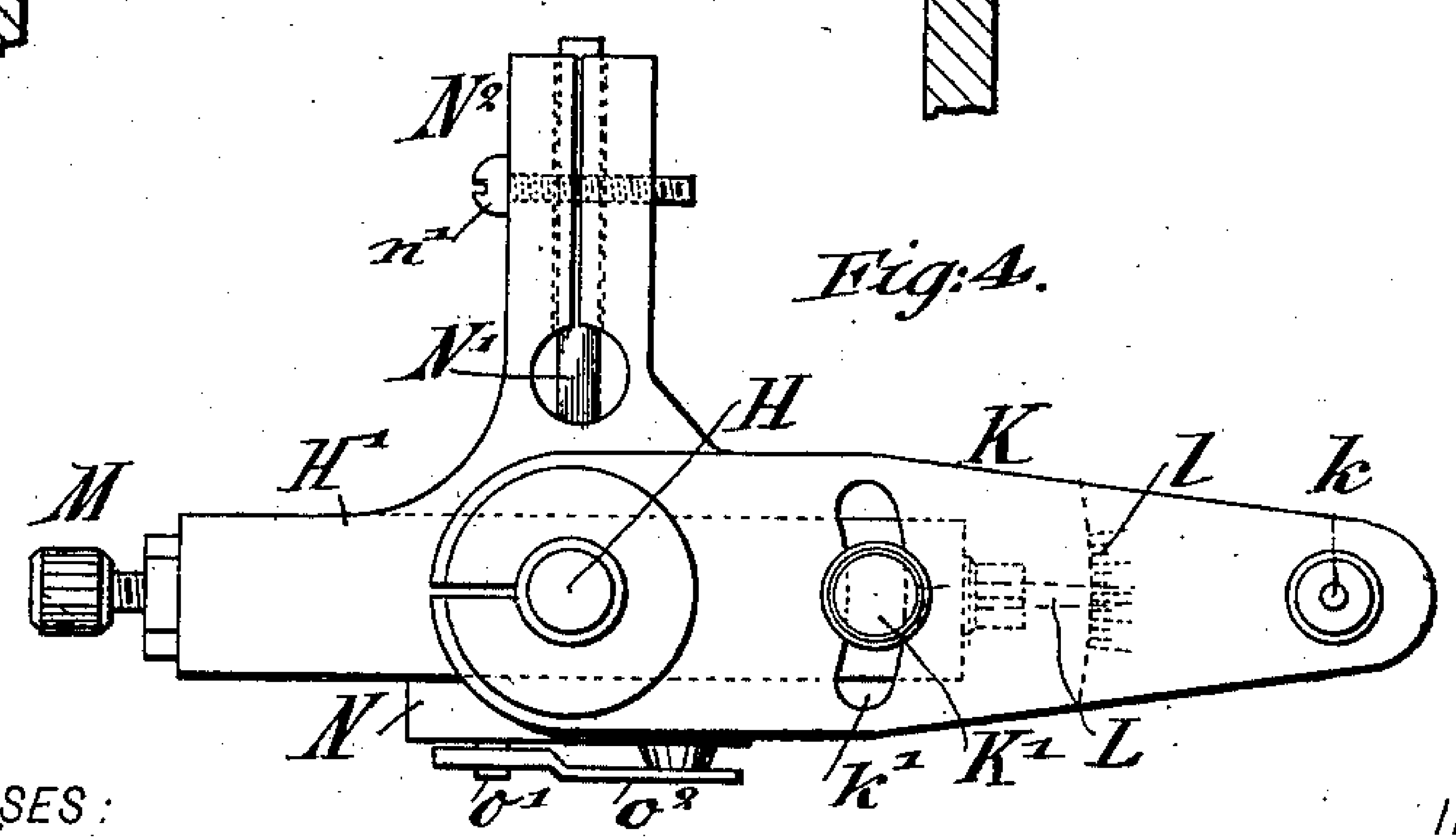


Fig:4.



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UNITED STATES PATENT OFFICE.

ERNEST LOESSER, OF NEW YORK, N. Y.

DIAMOND-CROSS-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 671,830, dated April 9, 1901.

Application filed May 2, 1899. Serial No. 715,304. (No model.)

To all whom it may concern:

Be it known that I, ERNEST LOESSER, a citizen of the United States, residing in the city of New York, in the borough of Manhattan and State of New York, have invented a certain new and useful Diamond-Cross-Cutting Machine, of which the following is a specification.

This invention relates to a diamond-cross-cutting machine, and has for its object the cross-cutting of diamonds or other precious stones for at once reducing the stone to better size for being worked up into diamond shape by removing and saving a fragment which can be fashioned into a small brilliant.

Heretofore the cutting of a precious stone, such as a diamond, to proper shape was accompanied by the tedious and slow reduction or grinding of all the removed parts to dust or powder, and sometimes a portion of considerable size had to be gradually ground off in this way before it was possible to produce the diamond shape or brilliant effect on the main body of the stone. The dust produced possesses some value, but not near the value of a single piece from which an equivalent quantity of dust could be produced. In accordance with my invention it is possible to save in one piece a portion or fragment which would under the former process be gradually and slowly removed in ground form, whereby a valuable fragment of the diamond is saved, which can be utilized for fashioning into a small brilliant.

The invention consists of a diamond-cross-cutting machine, such machine comprising a cutter, a chuck constructed to present a corner of the stone to the cutter, and means for supporting the said chuck; and the invention consists, further, of details of construction and combinations of parts to be hereinafter described and then finally claimed.

In the accompanying drawings, Figure 1 is a side elevation of a machine adapted to saw or cut through a diamond or other precious stone. Fig. 2 is a front elevation of the same. Fig. 3 is a plan view of the machine. Fig. 4 is a top view, enlarged, of the chuck-carrier. Fig. 5 is a transverse section on line 5 5, Fig. 3; and Fig. 6 is a detail sectional view of the chuck on line 6 6, Fig. 1.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A indicates a suitable supporting-frame which at one end is secured in any suitable manner to the work-table and which at the other end is provided with conical bearings *a* for the conical or tapering ends of rotary shaft B, on which is mounted a driving-pulley B′. Mounted also on said shaft and turning in a slot or opening in the supporting-frame A is a cutter C of disk shape, which is retained on the said shaft by means of clamping-disks C′ and nuts C^2 C^3, screwed onto the threaded portion of the shaft. As the cutter-disk is quite thin, (almost like a sheet of writing-paper,) it is braced by the broad flat contact-surfaces of the clamping-disks C′, and only so much of the peripheral portion of the cutter projects as is required for actual use. The cutter, while it has a knife-edge, at the same time, as is well known, such edge is made up of minute or microscopic teeth, and hence to distinguish the present invention from well-known diamond-cutting work the action of the cutter may be termed a "sawing" one. The cutter must be made of a metal of low heat-retaining property, as great heat is produced in sawing through such a hard stone as a diamond. The heat has no practical softening action on the metal, so that the diamond can always be cut through and through. A nicking disk or cutter C^4 is arranged also on the shaft B alongside cutter C and is made of the same metal.

Extending upwardly from the supporting-frame A is a pair of brackets D D, in conical bearings *d* of which is journaled the rock-shaft E, having pointed or conically-turned ends *e*, corresponding to the said bearings, so that almost frictionless bearings for the said shafts are produced. Mounted on the rock-shaft E is an arm F, which is provided with a lateral extension *f*, with a depending flange *f′*. The flange *f′* and the directly opposite portion of the arm F are provided with openings f^2 f^3, that are alined and through which the said shaft passes. One of the said openings—namely, f^2—is screw-threaded to receive a corresponding screw-thread *e′* on the rock-shaft, the screwing and unscrewing of

the rock-shaft being accomplished by a milled hand-wheel E′, fixed tightly on the same. This is an important adjustment, as thereby the arm F is moved laterally for the purpose to be hereinafter stated. Thumb-screws F′ F′, screwing into suitable screw-threaded bores in the arm and the extension, bind against the shaft E and fix it rigidly to the arm. G is a screw-threaded tail-rod onto which is screwed the counterbalance-weight *g*, which lessens or increases the downward pressure of the opposite end of the arm when adjusted. The said opposite end of the pivoted arm extends forwardly over the cutter and is provided with a split head F^2 and a vertical bore f^4.

A vertical spindle H is received in the bore f^4, said spindle forming part of the chuck-carrying frame, which is composed, in the main, of a yoke H′, from the center of which the said spindle extends. The projecting upper end of the spindle H has an annular groove *h*, into which is adapted to snap a suitable spring-catch I, secured by screws *i* to the arm F, so that when the spindle is pushed home in the split head F^2 the spring will at once snap into the said groove. The clamp formed by the split head F^2 is caused to bind tightly on the said spindle H by means of a screw J, passing transversely through the split portion of the head and having a hand-lever J′ for turning it. The yoke H′ is provided with a setting-bar K, through which the spindle H passes, the projecting end of said bar carrying a centering stud or pin K and the said bar being adjustably supported on the yoke, so as to swing around the spindle, by means of a set-screw K′, which passes through an arc-shaped slot *k*′, extending transversely in the bar K, and screws into the yoke. The centering-stud *k* is received in a recess k^2 in the under side of arm F. By means of the set-screw K′ the yoke is adjusted at an angle to the longitudinal axis of the arm F, and whatever be its position the combined action of the binding-screw J, set-screw K′, and the centering-stud *k* rigidly holds the yoke at the proper angle. In order to accurately set the yoke H′, the same is provided at its end under the bar K with a pointer L, that may be set opposite any of the series of graduations *l*, arranged on the under side of the said bar.

A conically-pointed pin *m* is firmly fixed in one of the bifurcations or legs of the yoke H′, so as to extend at right angles to the spindle H, and another conically-pointed but screw-threaded pin M is screwed into the opposite bifurcation or leg, so as to be axially in line with the other pin *m*. The head on pin M is provided with sockets to receive a suitable hand-lever, likewise the head of the before-described set-screw K′. The head N of the chuck for holding the stone to be operated on is preferably of rectangular shape and is provided at diametrically opposite points with trunnions *n*, having sockets conforming to and receiving the conical ends of the bearing pins or screws *m* M, so that the said head may swing on the axis passing through said screws. The chuck, consisting of the head N and parts to be hereinafter described, is provided with a laterally-extending lug or projection N′, which projects into the space between the jaws of an L-shaped split clamp N^2, that extends laterally and downwardly from the yoke H′. Clamping-screws *n*′, passing through the clamp N^2, bind the said clamp upon the projection N′ and secure the chuck in the position to which it is set. The chuck is thereby adjustable in a plane at right angles to the plane in which the yoke H′ is adjustable. The head N of the chuck has a bore *o* extending at right angles to its axial turning-point and which receives the shank *o*′ of a stone-retaining claw o^2, whereby the stone seated in a socket-piece P, received in a suitable socket *p* in the head N, parallel with the bore *o*, is held firmly in position. The retaining-claw o^2 is held firmly against the stone by means of set-screw *q*, which engages the shank of the claw. The stone retained in the chuck is supported thereby in contact with the cutter C referred to.

The machine described is operated as follows: The rough stone being at hand, the same is placed in proper position, as hereinafter stated, in the chuck. The arm F is now adjusted along the rock-shaft E, the yoke H′, by means of the setting-bar K and the binding devices, is adjusted at the proper angle, and the chuck is then adjusted at the proper angle to the yoke. These adjustments are necessary and depend upon the shape of the rough stone and the desired angle of cut to be made through it. Before cross-cutting by the cutter C a nick is cut by the nicking-cutter C^4 and the arm then adjusted laterally to proper position, so that the formed nick will receive the edge of cutter C. The position of the stone S relatively to the cutter is all important. It has been found practically impossible to cut or saw through the thicker portion of the stone first even with a metallic cutter having a very low heat-retaining power. With a cutter of this quality, however, revolved at a very high rate of speed and one corner of the stone presented to the cutter the latter will pass clear through the stone and cut or saw off a fragment, which heretofore in order to produce the flat table formed by the cross-cut had to be gradually ground down, producing diamond-dust of slight value compared to the value of the fragment saved. In addition, therefore, to the stone proper, which is fashioned into a brilliant in the usual manner of diamond cutting and polishing, there is also obtained a valuable fragment that is likewise fashioned into a small brilliant. Therefore the two points to be observed in this connection for cross-cutting a diamond are that the cutter be of high heat-resisting quality and that the corner of the stone be presented first to the cutter, so that

the latter will cut or saw through toward the thickest portion.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a diamond-cross-cutting machine, the combination of a vertical rotary cutting-disk, a pivoted arm extending over said cutting-disk, a stone-holding chuck supported by said arm on one side of its pivot, and a counterbalance-weight acting downwardly on the opposite end of the arm, substantially as set forth.

2. In a diamond-cross-cutting machine, the combination of a vertical rotary cutting-disk, an arm carrying at one end a stone-holding chuck and at the other end an adjustable counterbalance-weight, said arm being pivotally supported, between the chuck and weight, so as to extend over the cutting-disk, and means for laterally adjusting said arm relatively to the vertical plane of the cutting-disk, substantially as set forth.

3. In a diamond-cross-cutting machine, the combination of a vertical rotary cutting-disk, a suitably-journaled screw-threaded rock-shaft, an arm provided with a screw-threaded opening in which the screw-thread on the shaft engages, said arm being arranged in a plane over the cutting-disk, means for turning the said shaft in the said opening and thereby adjusting the arm relatively to the cutting-disk, and a stone-holding chuck supported by the arm, substantially as set forth.

4. In a diamond-cross-cutting machine, the combination of a vertical rotary cutting-disk, an arm arranged adjacent said cutting-disk, a chuck-supporting yoke provided with a spindle swiveled in said arm, means for adjusting the said yoke in a plane transversely to that of the cutting-disk, and a stone-holding chuck supported within the arms of said yoke, substantially as set forth.

5. In a diamond-cross-cutting machine, the combination of a vertical rotary cutting-disk, an arm adjustable laterally relative to the vertical plane of said disk, a chuck-supporting yoke provided with a spindle swiveled in said arm, means for adjusting the said yoke in a horizontal plane transversely to that of the said disk, a stone-holding chuck pivoted within the arms of said yoke, and means for swinging and adjusting said chuck in a vertical plane transverse to the plane of said disk, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

ERNEST LOESSER.

Witnesses:

GEO. L. WHEELOCK,

M. H. WURTZEL.