

(No Model.)

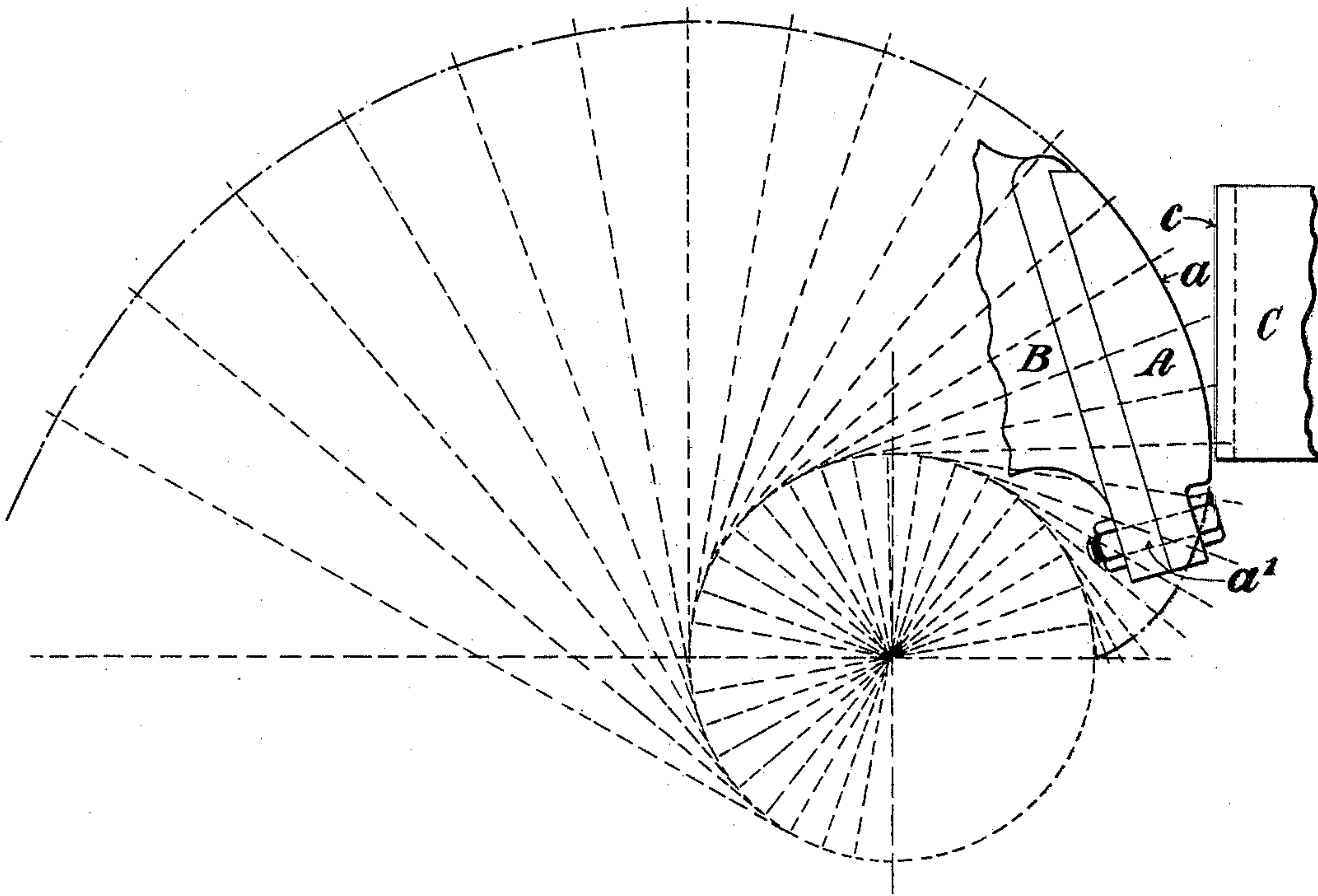
2 Sheets—Sheet 1.

A. JORDAN.  
CRUSHER.

No. 604,762.

Patented May 31, 1898.

*Fig.1.*



*Witnesses.*

*Horace E. Coulson.*

*Samuel Clark*

*Inventor.*

*Alfred Jordan*

*By W. J. Munden*

*His Attorney.*

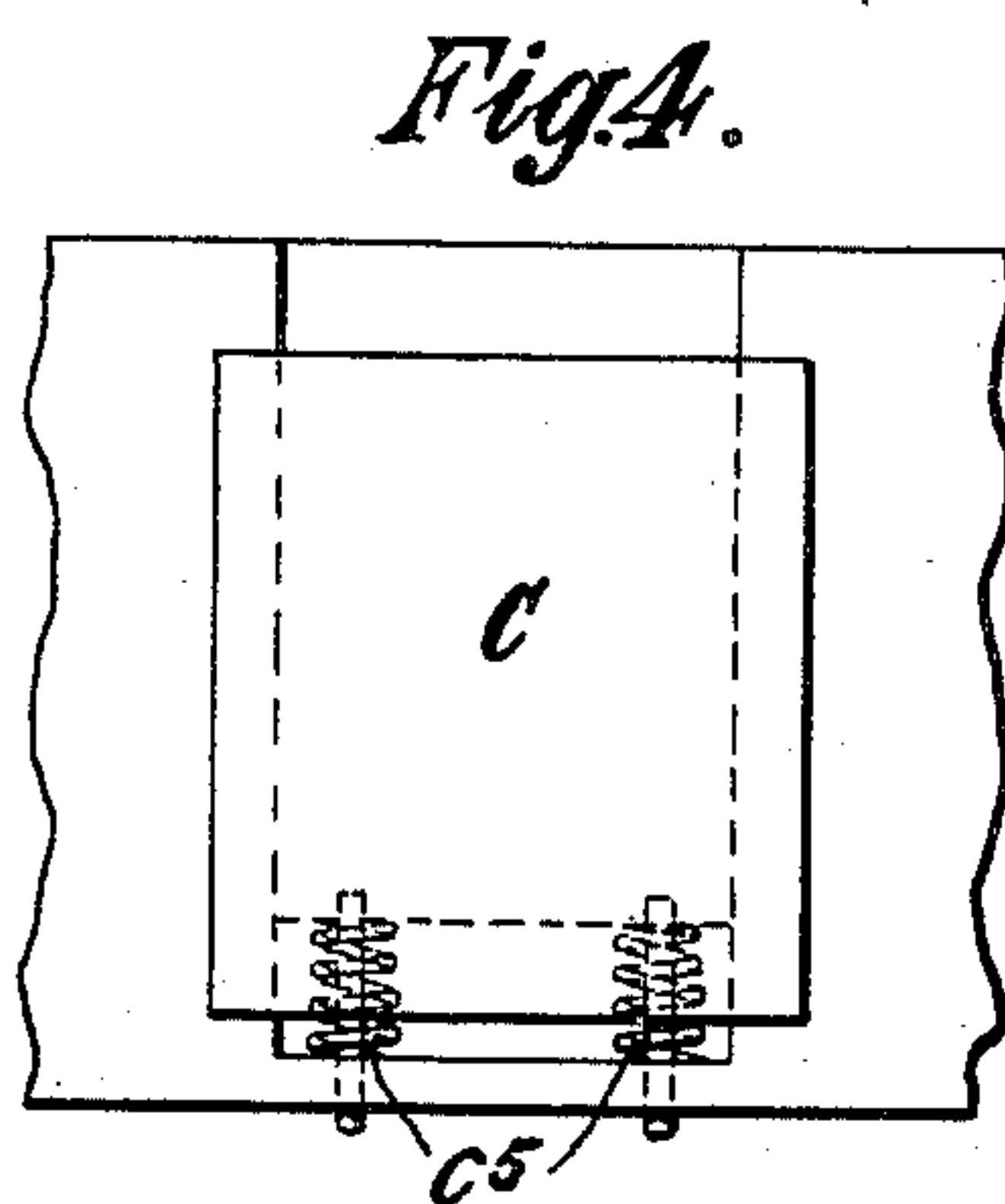
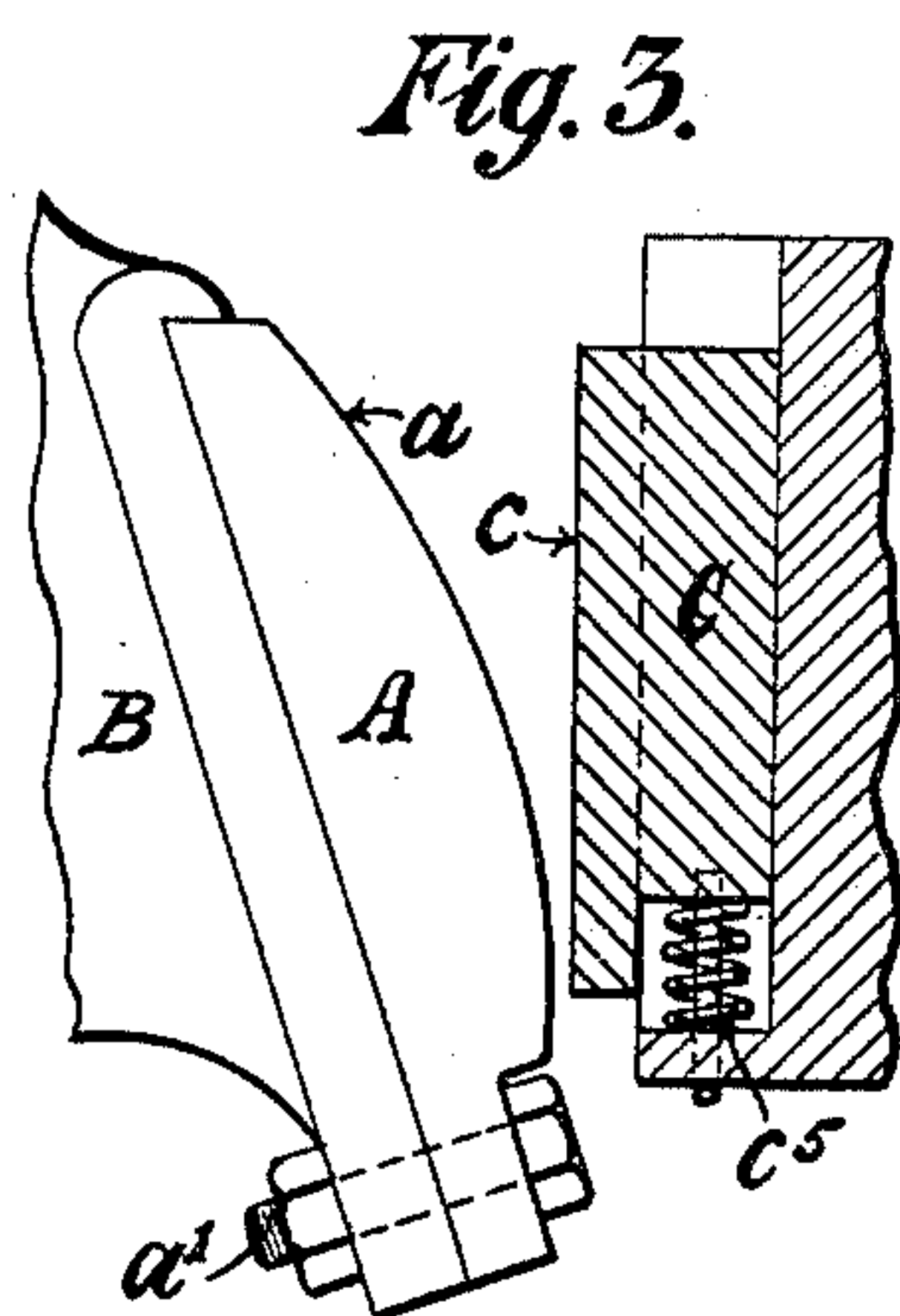
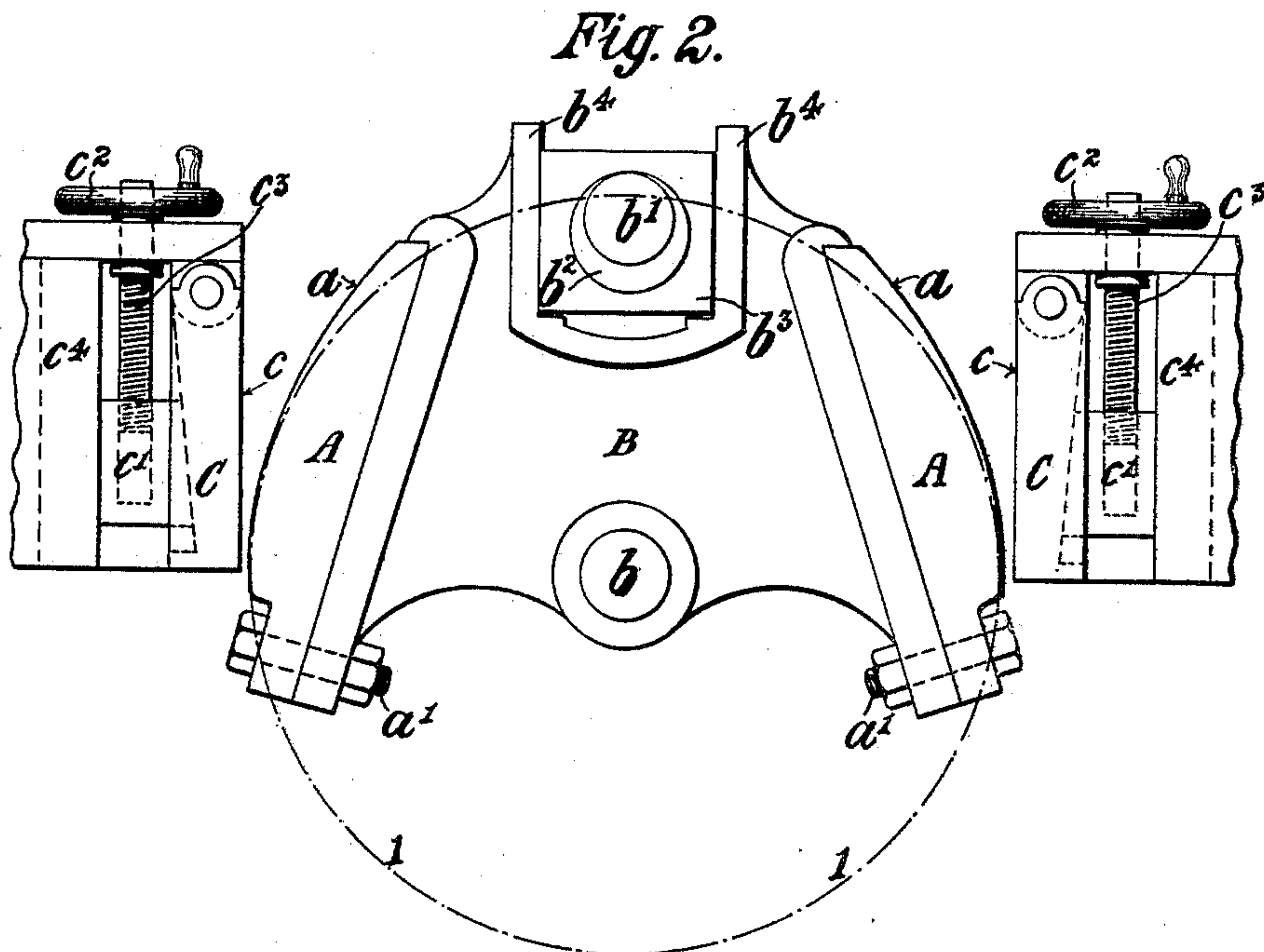
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2 Sheets—Sheet 2.

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# UNITED STATES PATENT OFFICE.

ALFRED JORDAN, OF LONDON, ENGLAND.

## CRUSHER.

SPECIFICATION forming part of Letters Patent No. 604,762, dated May 31, 1898.

Application filed July 3, 1896. Serial No. 598,015. (No model.) Patented in England April 21, 1896, No. 8,386.

*To all whom it may concern:*

Be it known that I, ALFRED JORDAN, a subject of the Queen of Great Britain, residing at 27 Mincing Lane, London, England, have  
5 invented certain new and useful Improvements in Crushers, (for which I have obtained a patent in Great Britain, No. 8,386, dated April 21, 1896,) of which the following is a specification.

10 This invention relates to apparatus for reducing, disintegrating, crushing, or grinding hard substances in which the operation is effected by submitting the substance to the action of a vibrating and a fixed jaw in such  
15 manner as to secure at the same moment a percussive and abrasive action.

It consists, first, in forming the working face of the movable jaw of the shape of a segment of the involute of a circle, and, secondly, of the general arrangement of the parts  
20 in such manner as to secure the most efficient action and the most perfect result.

The apparatus employed consists of a center piece capable of oscillating upon a fixed  
25 center, which oscillation causes the working face of the movable jaw to simultaneously advance and descend toward its corresponding fixed jaw, thus crushing or pulverizing the substance between the two jaws. In order  
30 to effect this, the involute crushing-surface must be placed at such an angle relative to the center of oscillation that the top portion of the crushing-surface shall be at a greater distance from the center of oscillation than the lower portion of the working  
35 part of the involute surface—that is to say, every portion of the involute crushing-surface, except its extreme lower edge, must be outside a circle which has the same radius as such extreme lower edge and the center  
40 of which circle is the point or center of oscillation.

The use of apparatus with jaws of the shape described enables me to produce disintegration  
45 more rapidly and with less expenditure of force than by the use of any other form of granulating or pulverizing machinery.

In the accompanying drawings, Figure 1 shows a circle and its involute as well as one  
50 movable jaw the working face of which is coincident with the involute. Fig. 2 is an elevation of a center piece having two involute-

shaped jaws attached to it, also showing two fixed jaws. Fig. 3 is a side elevation of a moving and a sliding jaw. Fig. 4 is a front  
55 elevation of the sliding jaw.

A circle of any suitable diameter may be chosen for the evolute, and its involute curve may be described in any convenient manner or any number of points in the involute  
60 curve may be found, a line passing through which forms the curve.

Any part of the involute may be chosen as suitable for the curve of the working face, and in Fig. 1, A designates the jaw, the work-  
65 ing face *a* of which is coincident with a part of the involute. The jaw is fixed to the center piece B by bolts *a'* or other suitable fastenings, which enable it to be taken off and replaced with facility. C indicates the fixed  
70 jaw, between the working face *c* of which and the face *a* the substance to be treated is deposited for the purpose of reduction or disintegration.

In Fig. 2 the general arrangement of parts  
75 is shown, it being understood that the fixed jaws, the fixed center upon which the center piece oscillates, and the bearings for the driving-shaft are all fixed to or mounted in a frame, this latter being omitted from the draw-  
80 ings in order to simplify it. A shaft *b* is either fixed rigidly to or mounted in bearings in the frame in such manner that the center piece B can be oscillated either upon or with it. *b'* is  
85 the driving-shaft, to which a motion of rotation may be given in any convenient manner, preferably by means of a pulley fixed upon the shaft. Upon this driving-shaft is fixed an  
eccentric sheave *b*<sup>2</sup>, working in a block *b*<sup>3</sup>, which  
90 is capable of sliding vertically in guides *b*<sup>4</sup>, these latter being formed integrally with the upper part of the center piece B. It is thus obvious that the rotation of the shaft *b'* and  
eccentric *b*<sup>2</sup> will produce an oscillation of the center piece B about the fixed center *b*. The  
95 fixed jaws C may be attached rigidly to the frame of the machine, so as to bring their working faces *c* opposite and in close proximity to the working faces *a* of the movable  
jaws A.

100 Instead of employing the shaft *b'*, eccentric sheave *b*<sup>2</sup>, and sliding block *b*<sup>3</sup> the center piece B can be caused to oscillate on the fixed center *b* by any other convenient means, such,



for instance, as by jointing a connecting-rod to any part of the center piece B in such manner that the reciprocation of the connecting-rod oscillates the center piece.

5 The working faces  $a$  of the movable jaws are, as before stated, shaped as an involute of a circle, and they are so disposed upon the center piece B that the upper parts of the working faces  $a$  are outside the circle 1 1,  
10 (shown in chain dotted lines,) such circle being described from the center of oscillation, with a radius equal to the distance of the lowest portion of the working-surface  $a$  from the center of oscillation. This arrangement  
15 of parts secures that when each of the working faces  $a$  in its turn approaches the fixed jaw C it also descends in such manner as to secure both a crushing and an abrasive action upon the materials under treatment.  
20 The jaws C may be adjusted by means of a wedge-shaped piece  $c'$ , which can be moved vertically upward or downward by means of a hand-wheel  $c^2$  and screw  $c^3$ . As the back of the wedge-shaped piece  $c'$  presses against  
25 a fixed abutment  $c^4$ , while its front presses against the back of the jaw C, it follows that by moving the wedge-shaped piece  $c'$  the jaw C can be adjusted at any convenient and suitable distance from the movable jaw A,  
30 thus securing any degree of fineness of the crushed material. The jaws are shown as having a straight face horizontally, but they may be curved, if desired.

35 In some cases, instead of using fixed jaws I employ jaws which are capable of sliding vertically, as shown in Figs. 3 and 4. The jaw C is here shown as capable of sliding in

the frame and normally forced upward by helical springs  $c^5$ . When the material is fed into the space between the jaws A and C and  
40 the movable jaw begins to descend, it takes with it the jaw C, causing it to move slightly downward, (compressing the spring  $c^5$ ,) but not to the same extent as the jaw A. By this means the abrasive action is secured by  
45 the movement of the two jaws at different velocities. When the movable jaw is receding from the jaw C, the latter is forced upward to its normal position by the springs  $c^5$ .

In some cases I attach two or more jaws, 50 one above the other, upon the same center piece and utilize them to effect a gradual reduction.

Having fully described my invention, what I desire to claim and secure by Letters Patent 55 is—

In a crushing or disintegrating apparatus, the combination of a movable jaw, the working face of which is shaped so as to form a segment of the involute of a circle and which 60 is pivoted upon a central spindle; means for rocking the same, and a sliding jaw normally forced into its highest position by means of springs, but capable of being drawn downward by the material under treatment when 65 the movable jaw descends, substantially as described.

In witness whereof I have signed this specification in presence of two witnesses.

ALFRED JORDAN.

Witnesses:

WILLIAM J. MUNDEN,  
SAMUEL CLARK.