

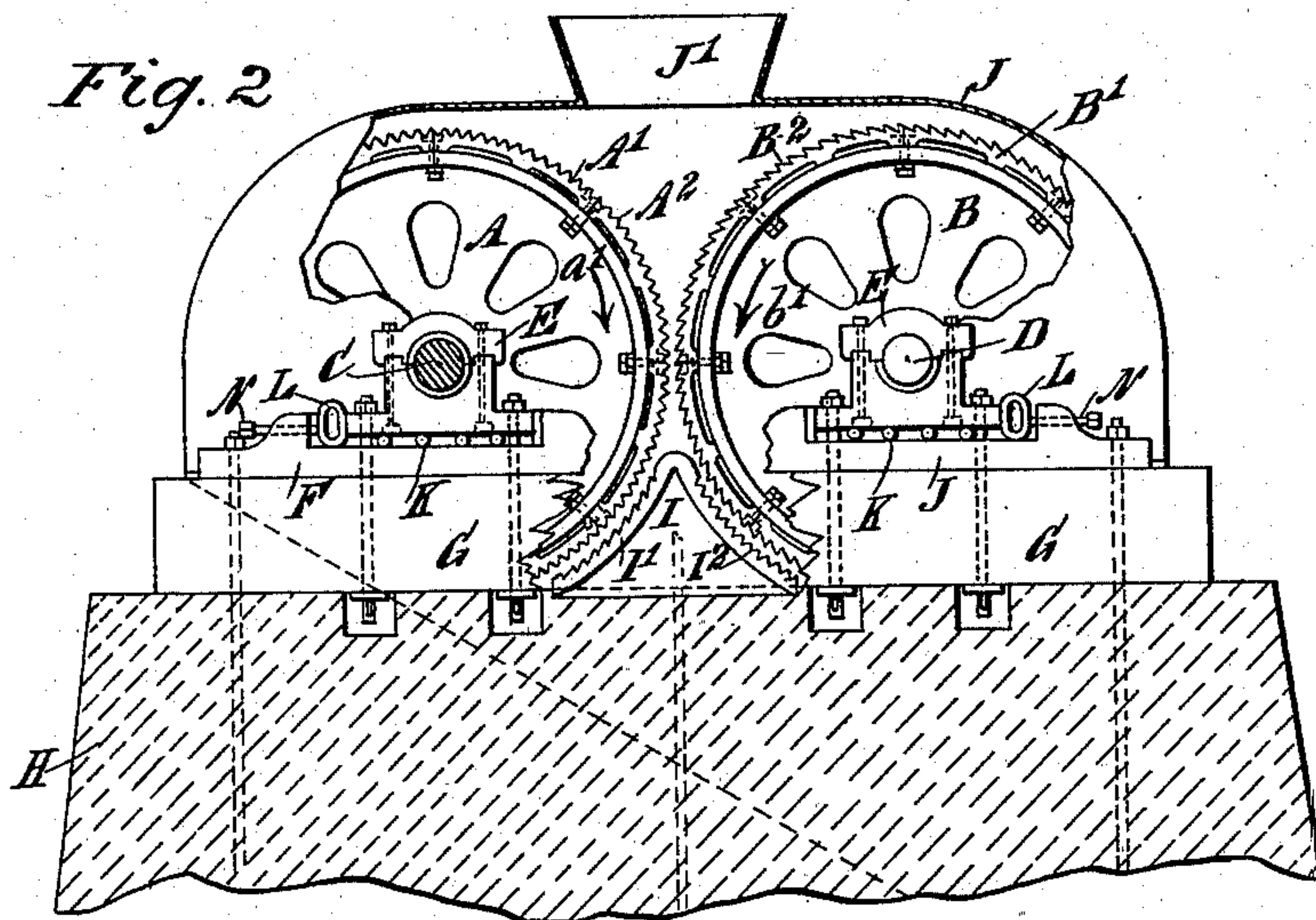
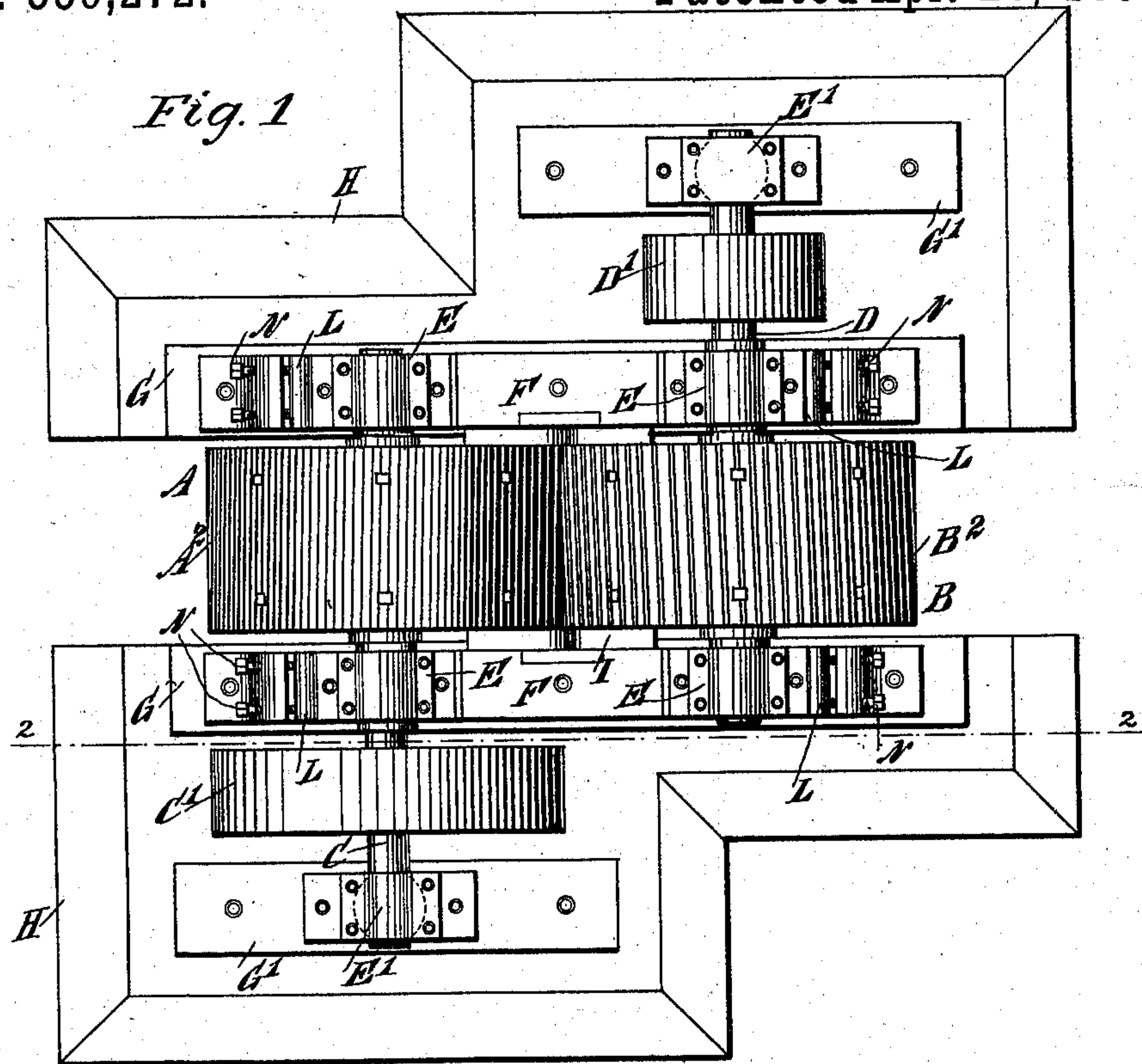
(No Model.)

2 Sheets—Sheet 1.

S. EVANS & F. J. MORGAN.
COAL CRUSHER.

No. 559,272.

Patented Apr. 28, 1896.



WITNESSES:

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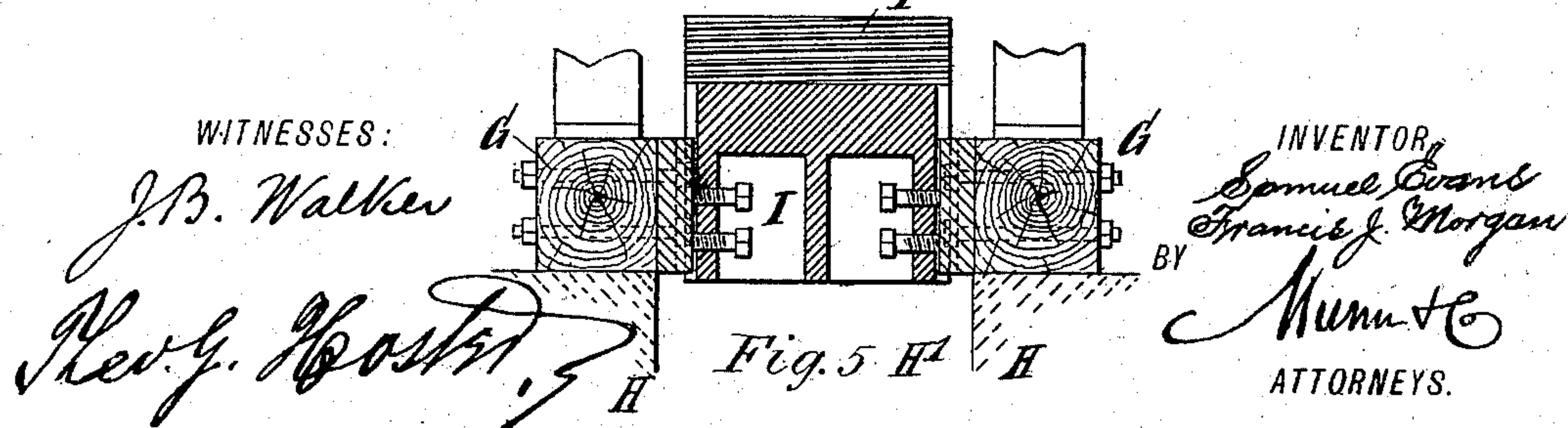
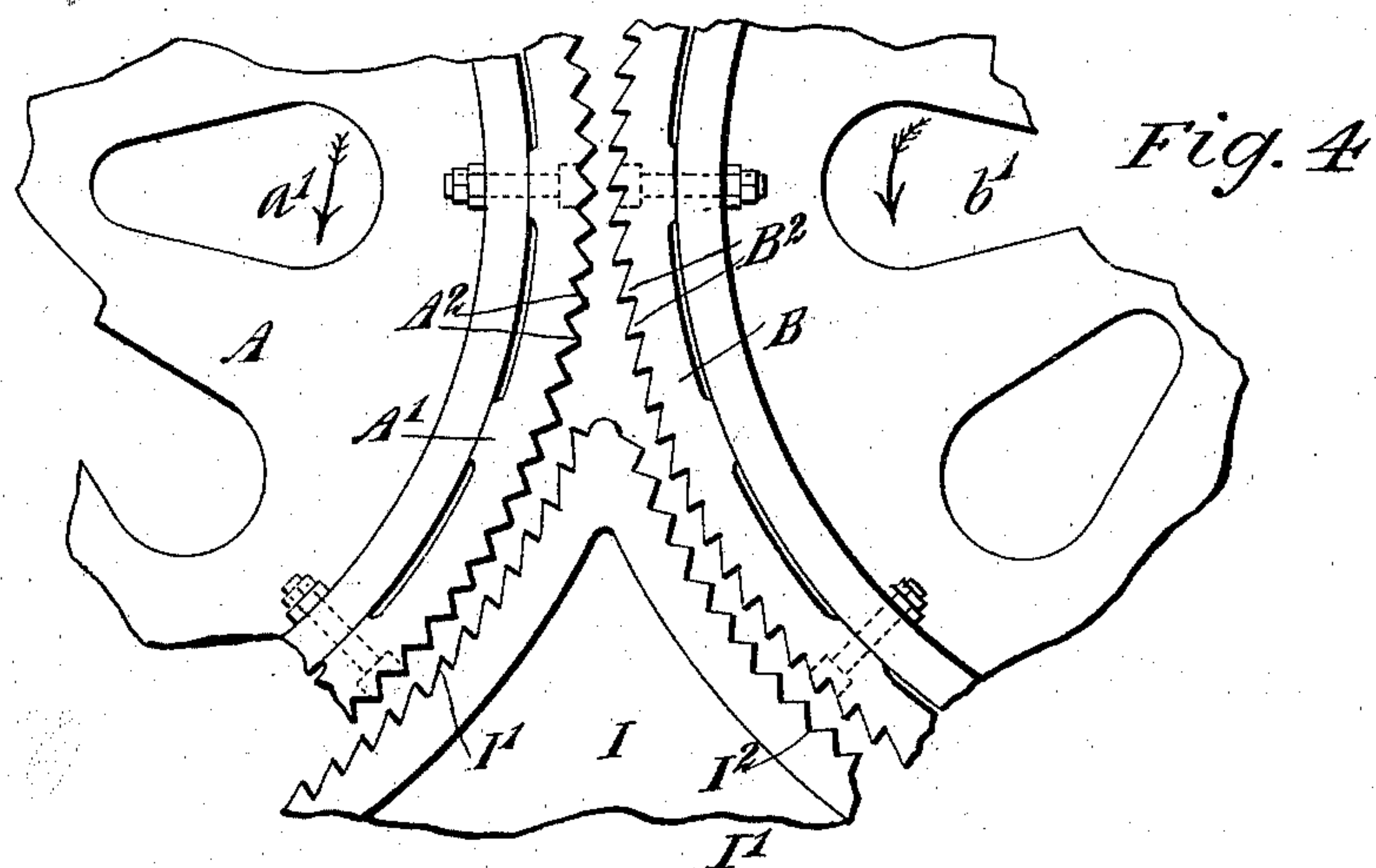
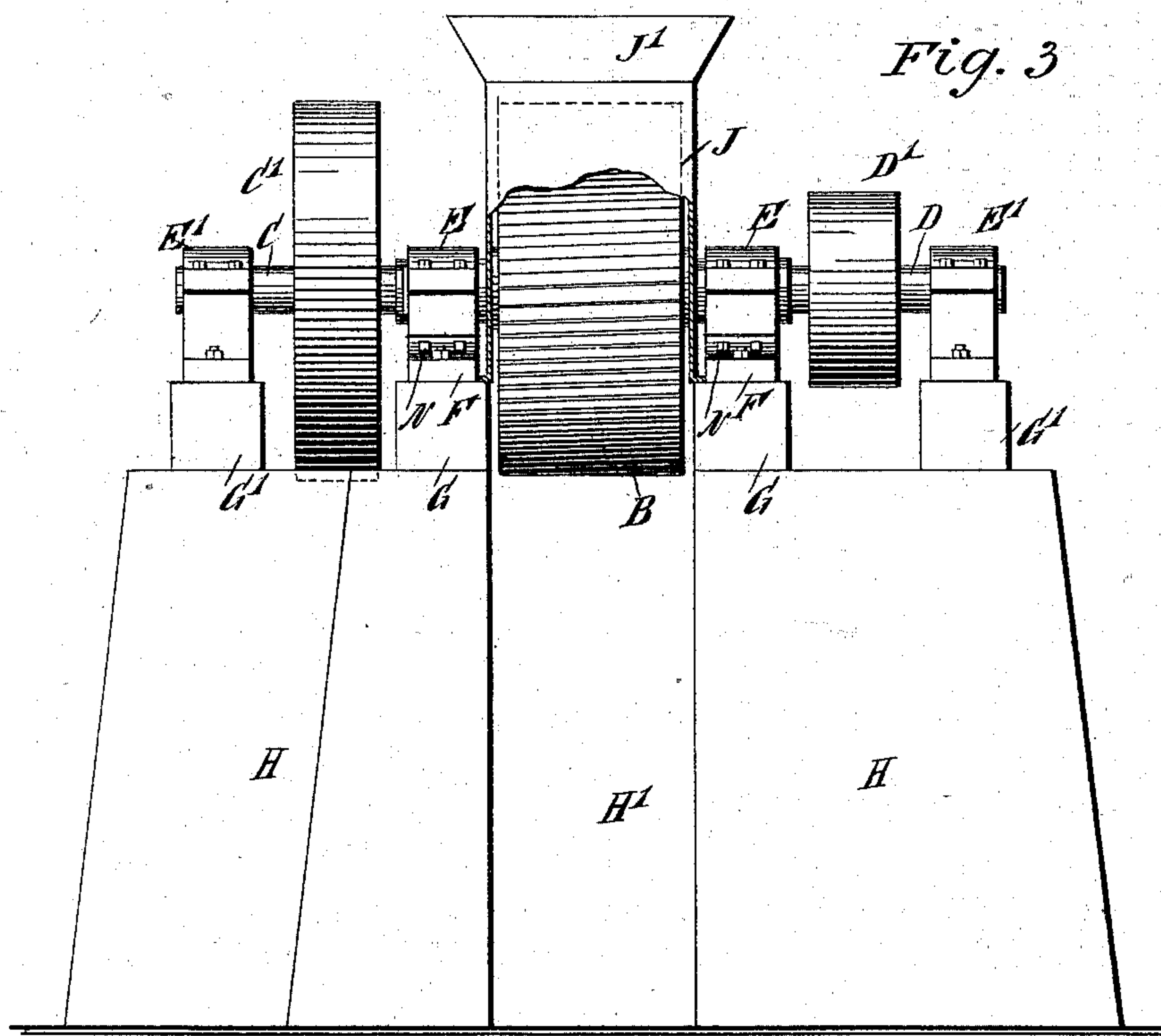
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

SAMUEL EVANS AND FRANCIS J. MORGAN, OF ELKHORN, WEST VIRGINIA.

COAL-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 559,272, dated April 28, 1896.

Application filed November 22, 1895. Serial No. 569,800. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL EVANS and FRANCIS J. MORGAN, of Elkhorn, in the county of McDowell and State of West Virginia, have
5 invented a new and Improved Coal-Crusher, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved coal-crusher which is simple and durable in construction, very effective in operation, not liable to block the material between the rolls, and more especially designed for disintegrating bituminous coal for the purpose of improving the quality of
15 coke made therefrom.

The invention consists principally of a feeding and crushing roll and a cutting-roll driven at a higher rate of speed than the said feeding and crushing roll, the latter being formed
20 on its periphery with transversely-extending diamond-pointed ribs and the cutting-roll being provided with transverse ratchet-ribs, the ribs of the two rolls being inclined to the axis of the rolls and disposed in opposite directions relative to each other.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improvement
35 with the casing removed. Fig. 2 is a sectional side elevation of the improvement on the line 2 2 of Fig. 1 and with part of the casing broken out. Fig. 3 is an end view of the same with parts of the casing broken out. Fig. 4
40 is an enlarged side elevation of part of the rolls and table, and Fig. 5 is a cross-section of the same.

The improved coal-crusher is provided with a feeding and crushing roll A and a cutting-roll B, adapted to rotate toward each other and at a different rate of speed for the purpose hereinafter more fully described. The rolls A and B are secured on transversely-extending shafts C and D, respectively, jour-
50 naled in bearings E, supported on plates F, attached to beams G held on suitable foun-

55 dations H, as is plainly shown in the drawings, said foundations being placed suitable distances apart to form a delivery space and chute H' for carrying off the crushed material.

On one end of the shaft C is secured a pulley C', connected by a belt with suitable machinery for imparting a comparatively slow rotary motion to said shaft C and the roll A in the direction of the arrow *a'*. The shaft
60 D of the other roll, B, is likewise provided at one end with a pulley D', smaller than the pulley C', and likewise connected with suitable machinery for imparting rotary motion to the shaft D and roll B in the direction of
65 the arrow *b'* and at a higher rate of speed than that given to the roll A. The ends of the shafts C and D next to the pulleys C' and D' are journaled in bearings E' by ball-and-socket joints, as indicated in Fig. 1, so that
70 the shafts can slightly swing, for the purpose hereinafter more fully described.

The roll A is provided on its periphery with segmental sections A', fastened by bolts or other means to the rim of the roll, and the
75 said sections A' are formed on their surfaces with transversely-extending ribs A², made diamond-shaped, as is plainly indicated in Fig. 4, the ribs extending transversely, but at a slight inclination relative to the axis of
80 the roll. (See Fig. 1.) The other roll B is also formed with segmental sections B', attached to the rim of the roll, and each section is formed on its outer face with transversely-extending ribs B², made ratchet shape,
85 with the cutting edges in the direction of the travel of the roll. (See the arrow *b'* in Fig. 4.) The ribs B² stand at an angle to the axis of the roll B and in an opposite direction to the ribs A², as will be readily understood by ref-
90 erence to Fig. 1.

Between the two rolls A and B at their lower ends is arranged a table I, having its sides segmental, with the axis of the rolls as a center of curvature. The side of the table I
95 next to the roll A is formed with transversely-extending ribs I', made ratchet shape and similar to the ribs of the roll B, and on the side of the table I next to the roll B are formed transversely-extending ribs I², made
100 diamond shape, similar to the ribs A² of the other roll A. The cutting edges of the ribs

I' extend upwardly—that is, in an inverse direction to the cutting edges of the ribs B², as will be readily understood by reference to Fig. 4.

5 The rolls are preferably inclosed in a casing J, made of sheet metal or other suitable material, and formed at its top near the middle with a hopper J', through which the coal to be crushed is introduced, so as to pass between the rolls A and B, revolving in the direction of the arrows a' and b', as previously mentioned, and shown in Figs. 2 and 4.

Now when the machine is in motion the ribs A² of the crushing-roll A, on account of their peculiar form, produce a feeding of and a crushing action on the material, while the ribs B² of the roll B insure a cutting action on the material, it being understood that the coal passing between the two ribs A² B² is held therein at the time the cutting edges of the ribs B² of the faster revolving roll B pass the said material, said ribs at the same time tending to crush the material contained in the adjacent ribs A². By this arrangement the material is fed, cut, and crushed by the two rolls and a clogging of the material in the ribs of either of the rolls is entirely prevented, as the material will readily drop out of the ribs B² as well as out of the ribs A², owing to their peculiar form and by reason of the movement of the rolls. The material thus crushed and cut passes upon the sides of the table I, to be again subjected to a crushing or cutting action of the ribs A² I' and B² I². The table I is held vertically adjustable, so that the sides of the table can be brought nearer to or farther from the peripheral surfaces of the rolls A and B and permit of reducing the material to a finer or coarser state, as desired.

In order to prevent breaking of the ribs A² and B² by pieces of iron or other similar material passing between the rolls with the material, the following device is provided: The bearings E for the rolls are set on rollers K held on the top of the plates F, as is plainly shown in Fig. 2, to permit the bearings E to slide longitudinally and move the rolls A and B apart in case a piece of iron passes between the rolls, it being understood that the shafts C and D are free to swing, as previously mentioned, owing to their ball-and-socket joints, in the bearings E'. The bearings E are normally held in the proper position and are prevented from sliding outwardly on the rollers K by shells L, made of fragile material and placed on the outer ends of the bearings, the shells abutting on screws N, screwing in the plates F. Now when a piece of iron passes between the two rolls A and B, then the latter are forced apart and the shells L break, and consequently the bearings E are free to slide outward to permit the piece of iron to

freely pass through the widened space between the rolls A and B.

Having thus fully described our invention, we claim as new and desire to secure by Letters Patent—

1. A coal-crusher, comprising a crushing-roll, a cutting-roll, the said crushing-roll being provided on its periphery with transverse diamond-pointed ribs, and the said cutting-roll being formed with ratchet-ribs, the ribs standing at an angle to the axis of their rolls and in opposite directions relatively to each other, and a table formed with segmental sides adjacent to the peripheries of said rolls, the side next to the crushing-roll being formed with transverse ratchet-shaped ribs, and the side adjacent to the cutting-roll formed with transverse diamond-pointed ribs, substantially as shown and described.

2. A coal-crusher, comprising a feeding and crushing roll, a cutting-roll driven at a higher rate of speed than the feeding and crushing roll, the latter being provided on its periphery with transverse diamond-pointed ribs, and the cutting-roll being formed with ratchet-ribs, the ribs standing at an angle to the axis of their rolls and in opposite directions relative to each other, and a table formed with segmental sides adjacent to the peripheries of said rolls, the side next to the feeding and crushing roll being formed with transverse ribs made ratchet shape, and the side adjacent to the cutting-roll formed with transverse diamond-pointed ribs, substantially as shown and described.

3. A coal-crusher, comprising a feeding and crushing roll, a cutting-roll driven at a higher rate of speed than the feeding and crushing roll, the latter being provided on its periphery with transverse diamond-pointed ribs, and the cutting-roll being formed with ratchet-ribs, the said ribs standing at an angle to the axis of their rolls and in opposite directions relative to each other, a table formed with segmental sides adjacent to the peripheries of said rolls, the side next to the feeding and crushing roll being formed with transverse ribs made ratchet shape, and the side adjacent to the cutting-roll formed with transverse diamond-pointed ribs, and means for adjusting said table vertically, to bring the side nearer to or farther from the peripherally-ribbed surfaces of said rolls, substantially as shown and described.

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