

No. 711,471.

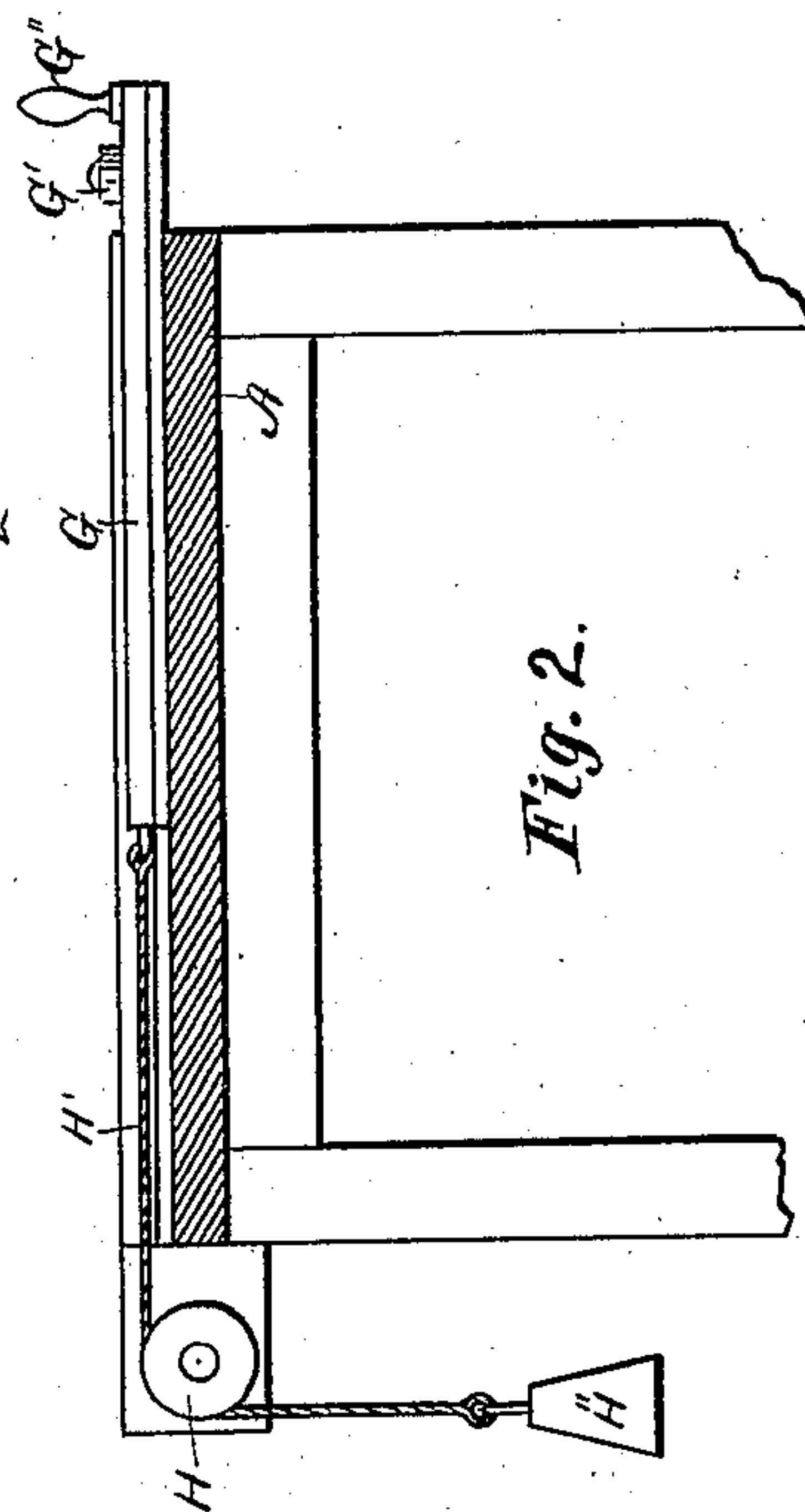
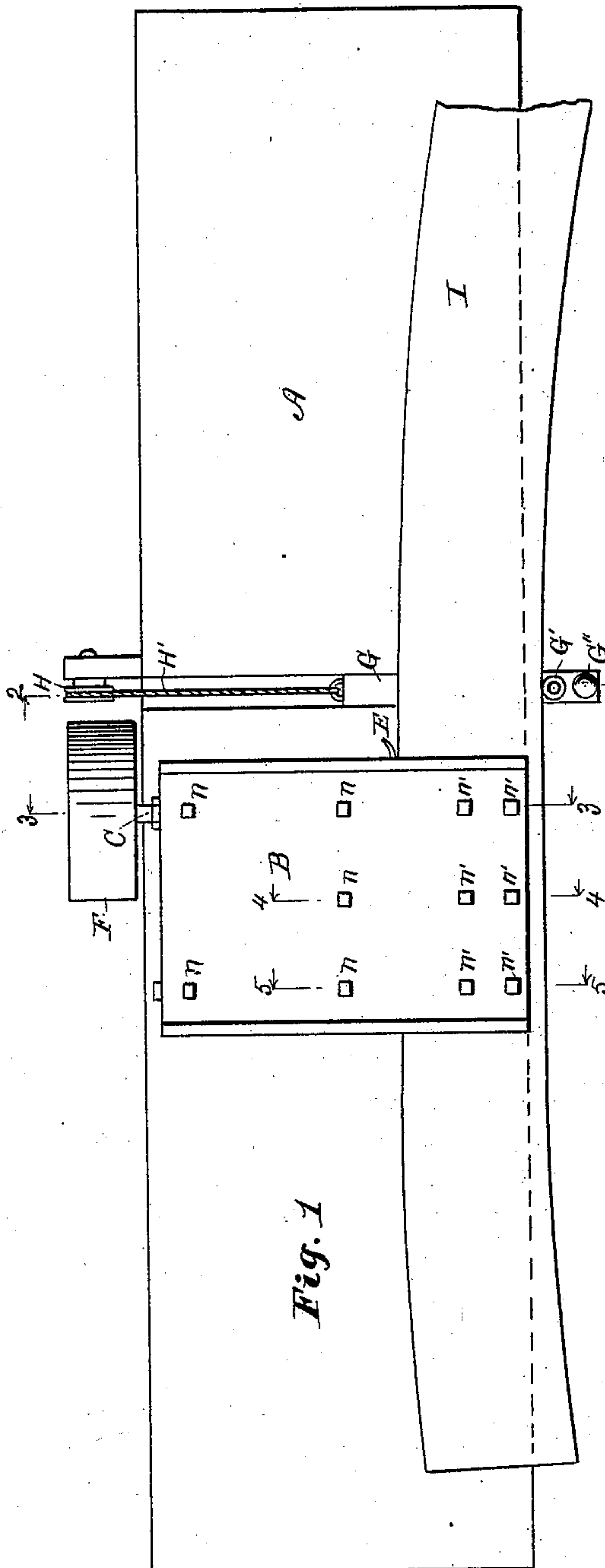
Patented Oct. 21, 1902.

A. E. CHAMBERS & L. H. BULLARD.
MACHINE FOR BENDING OR FLANGING SHEET METAL.

(Application filed June 6, 1902.)

2 Sheets—Sheet 1.

(No Model.)



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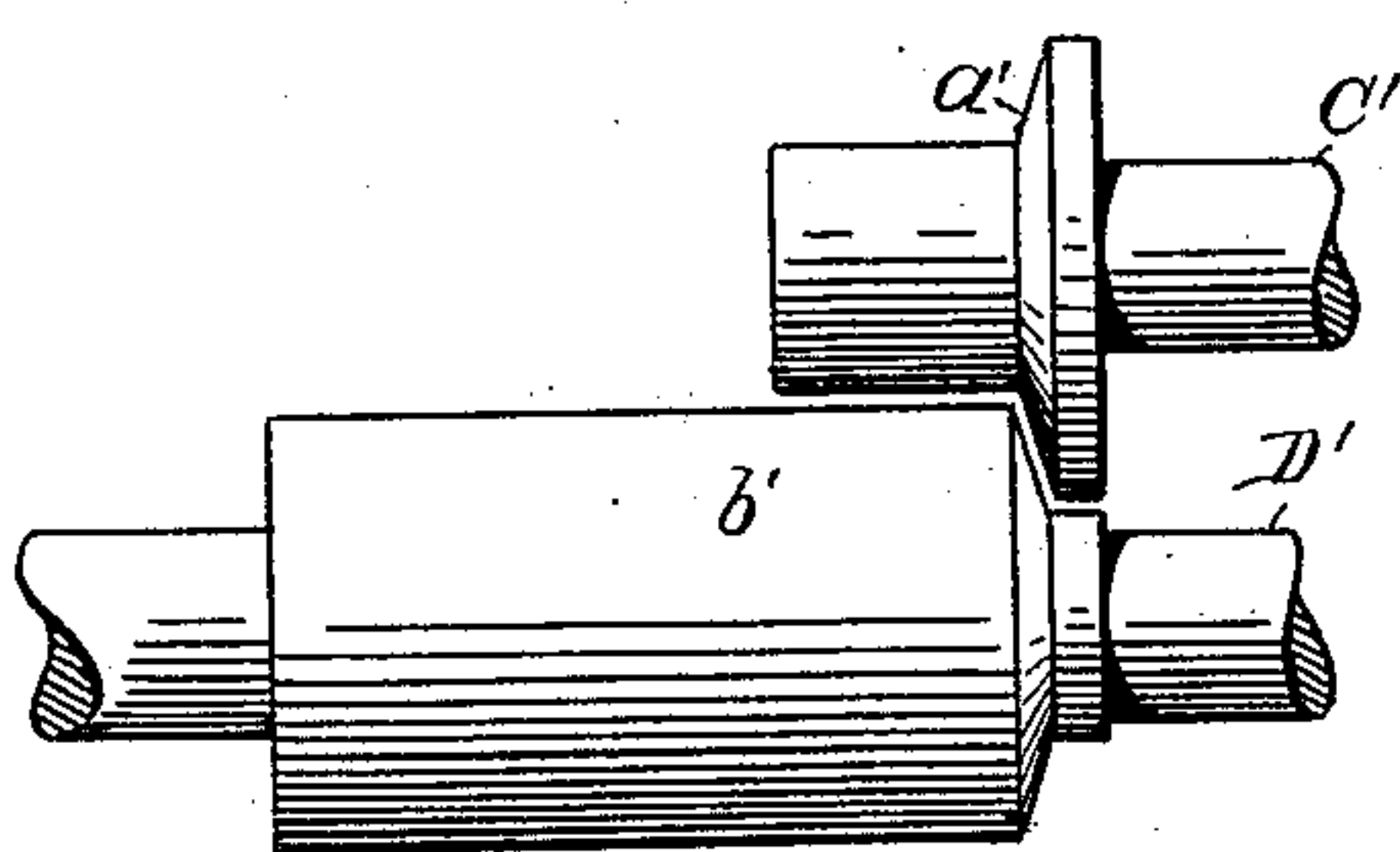
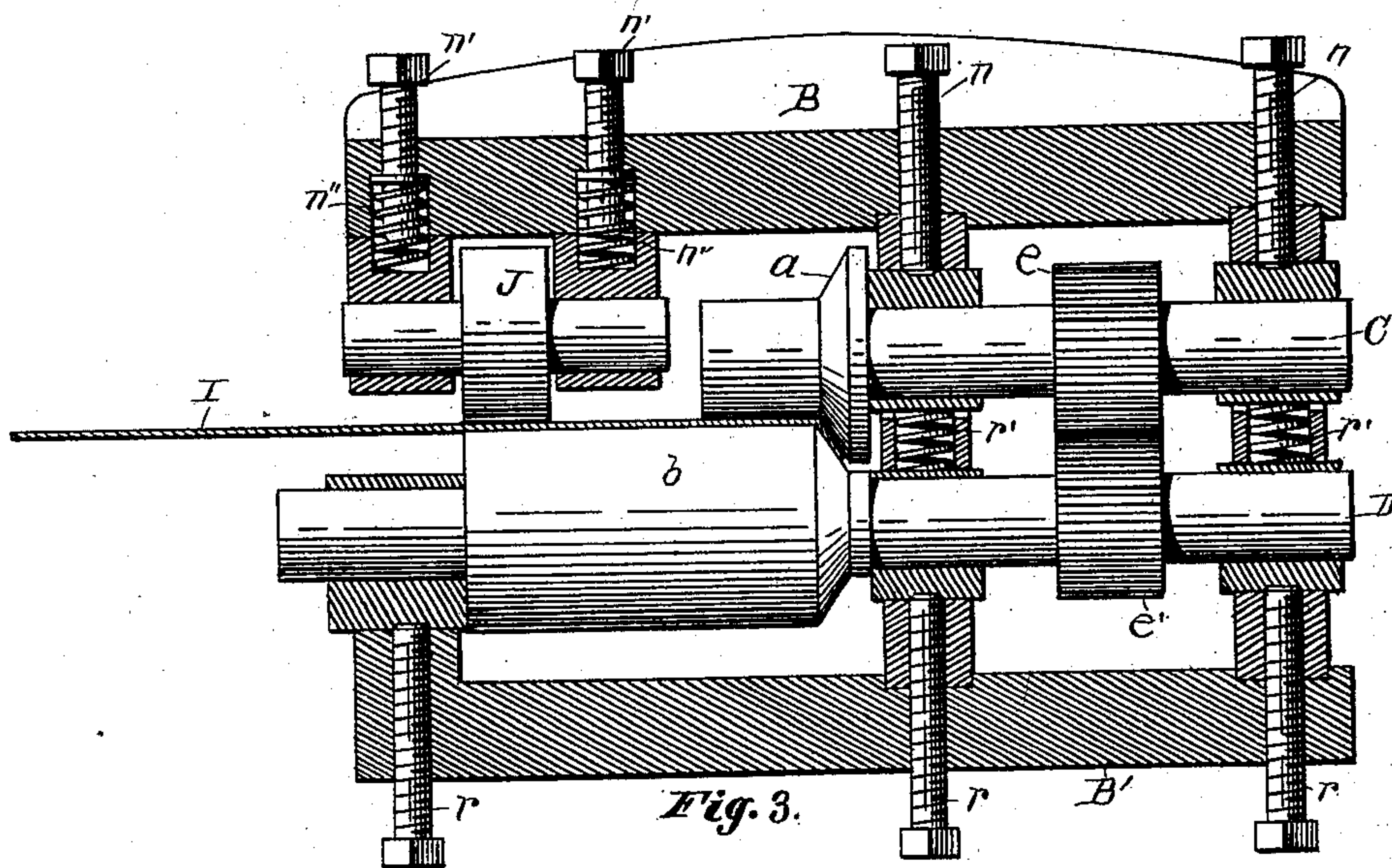


Fig. 4.

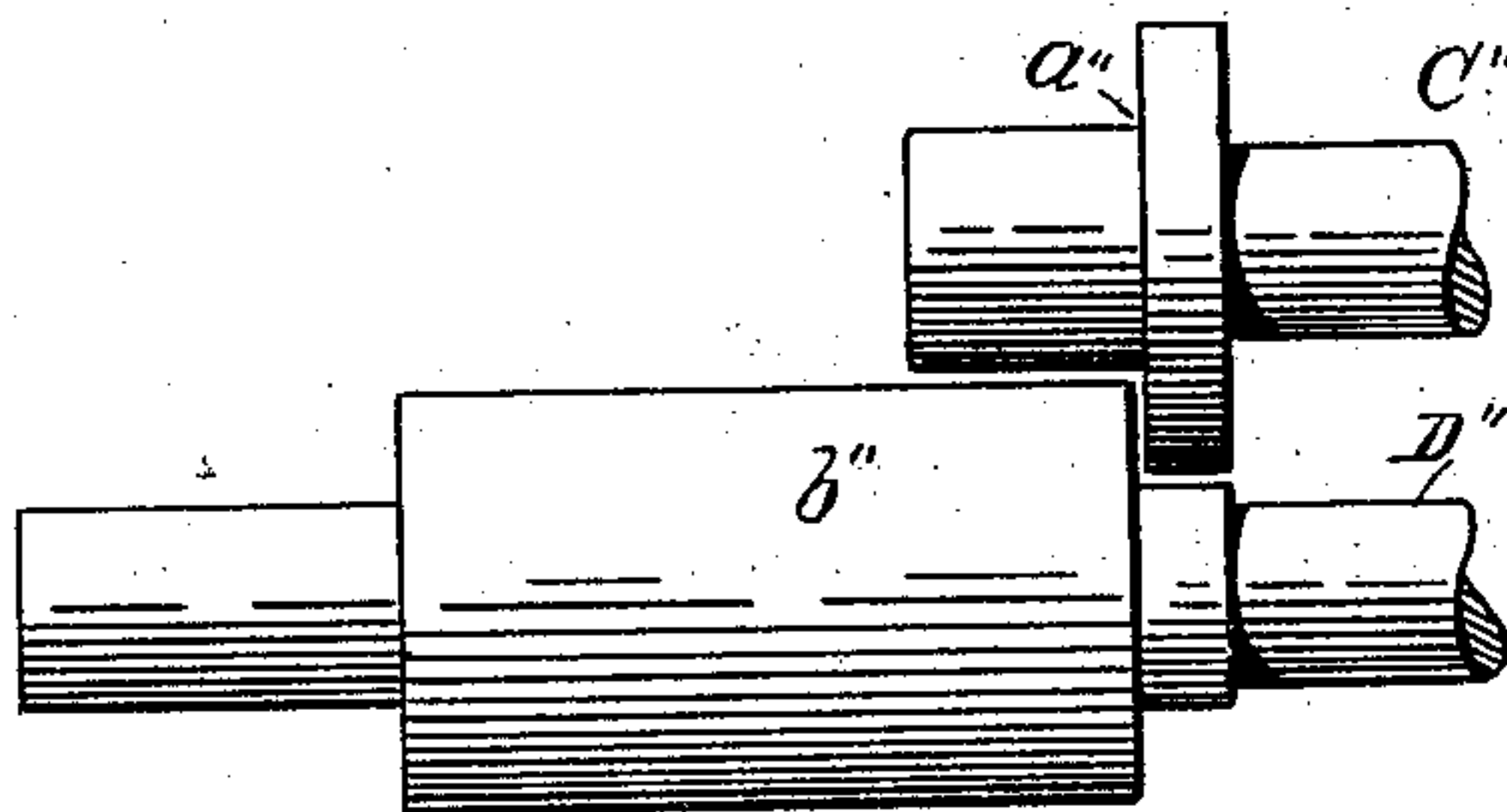


Fig. 5.

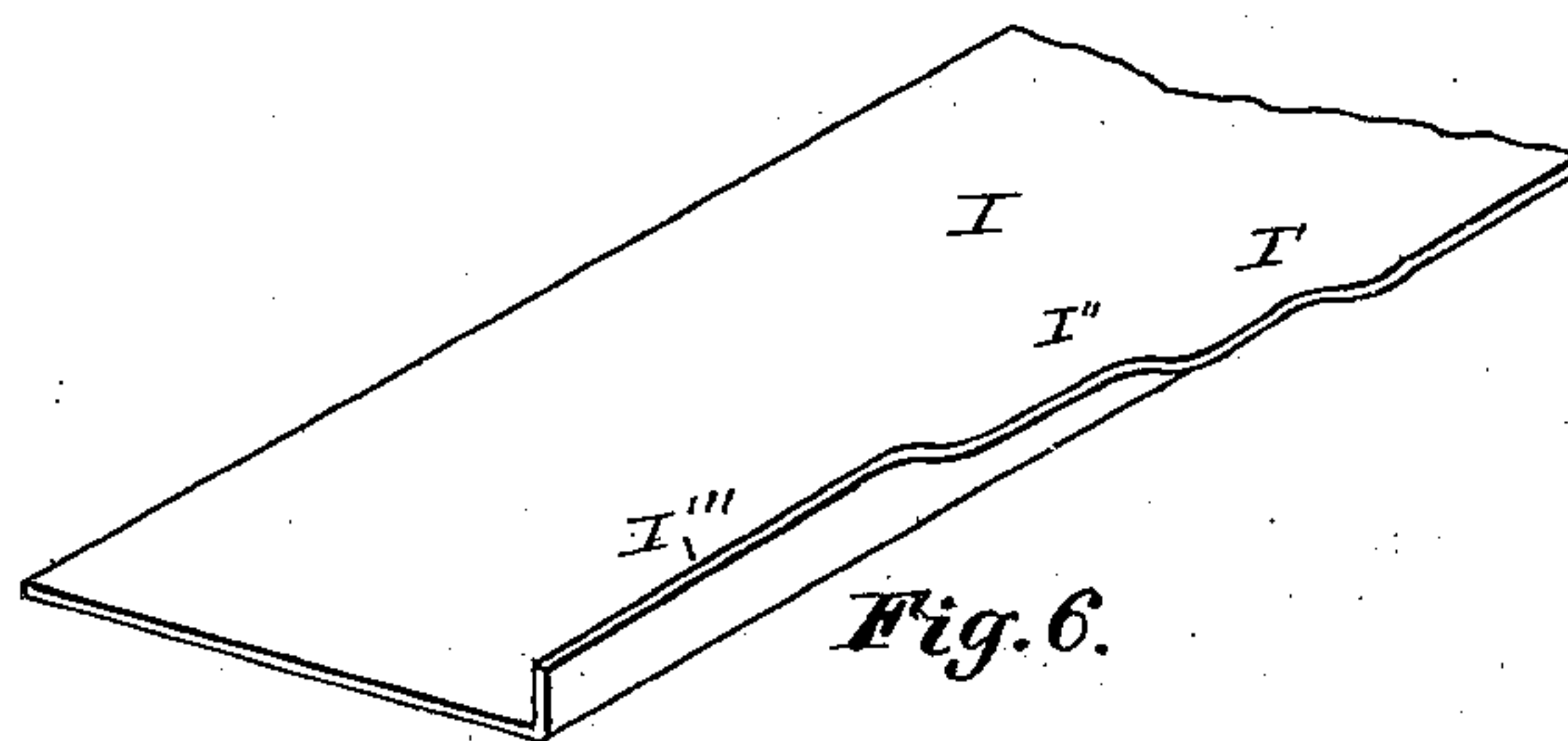


Fig. 6.

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UNITED STATES PATENT OFFICE.

ARTHUR E. CHAMBERS AND LEWIS H. BULLARD, OF DETROIT, MICHIGAN, ASSIGNORS TO MICHIGAN STEEL BOAT COMPANY, OF DETROIT, MICHIGAN.

MACHINE FOR BENDING OR FLANGING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 711,471, dated October 21, 1902.

Application filed June 6, 1902. Serial No. 110,444. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR E. CHAMBERS and LEWIS H. BULLARD, citizens of the United States, residing at the city of Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Machines for Bending or Flanging Sheet Metal, of which the following is a specification.

10 This invention relates to improvements in machines for bending or flanging sheet metal.

The objects of the invention are, first, to provide a machine for bending or flanging sheet metal of irregular shapes or sheet-metal strips having regular or irregular curves which is durable, compact, and simple in its construction and simple and easy to operate; second, to provide an improved adjustable feed and bending roller to accommodate variations in the thickness of the metal; third, to provide a machine for the purpose in which the metal formed or bent is gradually formed into the desired shape, so that the fiber of the same is not injured or destroyed thereby.

25 Further objects will definitely appear in the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification.

30 The invention is clearly defined and pointed out in the claims.

A structure embodying the features of our invention is fully illustrated in the accompanying drawings, forming a part of this specification, in which—

35 Figure 1 is a plan view of a machine embodying the features of our invention, showing the arrangement of parts, it being illustrated with a strip of metal passing through the same. Fig. 2 is an enlarged detail sectional view taken on a line corresponding to line 2 2 of Fig. 1, showing the means of automatically holding the sheet metal to be operated upon into the machine. Fig. 3 is an enlarged detail sectional view taken on a line corresponding to line 3 3 of Fig. 1, the rolls and shafting being shown in full lines. Fig. 4 is an enlarged detail view of the bending-rolls $a' b'$, taken on a line corresponding to line 4 4 of Fig. 1. Fig. 5 is an enlarged de-

tail view of the bending-rolls $a'' b''$, showing their relation to each other, taken on a line corresponding to line 5 5 of Fig. 1. Fig. 6 is a perspective view of a strip of metal as it appears when removed from the machine after being passed part way through the rolls or while being operated upon.

In the drawings similar letters of reference refer to similar parts throughout the several views, and all of the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines.

Referring to the lettered parts of the drawings, A is a table or support for the machine which carries the bending-rolls, which are centrally located on the table. B is the frame-work. Supported in adjustable bearings in the frame B is a series of shafts C C' C'', and below these in a second or corresponding series are shafts D D' D''. The shafts C and D and C'' and D'' are geared together by cog-gears, as $e e'$. The machine is driven by a pulley F on the shaft C.

Keyed or otherwise secured on the shafts C C' C'' are rollers $a a' a''$, respectively. Each of these rollers has a flange at one end, the flange on the roller a being formed at an angle of about forty-five degrees, that on the flange a' at about sixty degrees, while that on the flange a'' is formed at right angles to the same. Keyed or otherwise secured on the shafts D D' D'' are rollers $b b' b''$, respectively. These rollers are cut away or formed at an angle corresponding to the angles of the flanges on their corresponding rollers $a a' a''$. The bearings for the shafts are adjustable to and from its corresponding shaft by the set-screws n above and r below. Each pair of shafts is held normally separated by spring-pressure, coiled springs r' being arranged between the bearings.

The rollers $b b' b''$ are preferably elongated to form supporting and feed rolls for the metal as it passes through the bending-rolls, and pressure-rolls J are provided to hold the metal to the rolls. The rolls J are supported by adjustable bearings, suitable set-screws, as n , being provided for the purpose of adjustment. The rolls J are held normally downward under spring tension by the springs n'' , so that

the metal passing through the same is held firmly to the rolls.

A guide E is provided to guide the metal into the machine in a proper manner to be engaged by the bending-rolls, and a second guide G, which is adapted to reciprocate in a groove in the table, is provided to hold the metal firmly against the guide E and to hold the same from lateral movement while in the machine. This guide is provided with a roller G', which is adapted to rest against the edge of the metal, and a handle G'' for controlling it. This guide is held under constant tension by a weight H'', secured to it by the cord H', which passes over the pulley H.

In operation a strip of sheet metal, as I, is fed into the machine from the right and is engaged by the first set of bending-rolls *a b*. These rolls turn its edge about sixty degrees, as at I'. (See Fig. 6.) It is then engaged by the bending-rolls *a' b'*, which gives its edge a further turn to about forty-five degrees, as at I''. The rollers *a'' b''* then engage the same, and its edge is turned into the position shown at I''', which is at right angles. It is apparent that the angle may be made whatever is desired by changing the angle of the flanges of the bending-rolls.

We have illustrated and described our improved bending-machine in the form which we believe to be the most simple and satisfactory, though we are aware that it is capable of considerable structural variations without departing from our invention.

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

1. In a machine for bending or flanging sheet metal, the combination of a frame B having an open side; a suitable support therefor; shafts C, C', C'' and D, D', D'' arranged in pairs and supported in suitable adjustable bearings in said frame; springs between said bearings whereby they are held normally apart; bending-rolls *a, a', a''* having flanges formed at varying angles; bending-rolls *b, b', b''* cut away at varying angles to correspond to the flanges on said bending-rolls *a, a', a''*; pressure-rollers J supported in suitable bearings above said rolls *b, b', b''* and held normally against the same by spring-pressure; stationary guide E to guide the metal to be bent into the machine; tension-guides G for holding said metal in position in the machine; gear connections for said shafts; and means for rotating said shafts, all coacting substantially as described and for the purpose specified.

2. In a machine for bending or flanging sheet metal, the combination of the frame B having an open side; a suitable support therefor; shafts C, C', C'' and D, D', D'' arranged in pairs and supported in suitable adjustable bearings in said frame; springs between said bearings whereby they are held normally apart; bending-rolls *a, a', a''* having flanges formed at varying angles; bending-rolls *b, b', b''* cut away at angles to correspond to the flanges on said bending-rolls *a, a', a''*; pressure-rollers J supported in suitable bearings above said rolls *b, b', b''* and held normally against the same by spring-pressure; a tension-guide to hold the metal to be bent into the bending-rolls; gear connections for said shafts; and means for rotating the said shafts, all coacting substantially as described and for the purpose specified.

3. In a machine for bending or flanging sheet metal, the combination of the frame B having an open side; a suitable support therefor; shafts C, C', C'' and D, D', D'' arranged in pairs and supported in suitable adjustable bearings in said frame; springs between said bearings whereby they are held normally apart; bending-rolls *a, a', a''* having flanges formed at varying angles; bending-rolls *b, b', b''* cut away at angles to correspond to the flanges on said bending-rolls *a, a', a''*; pressure-rollers J supported in suitable bearings above said rolls *b, b', b''* and held normally against the same by spring-pressure; gear connections for said shafts; and means for rotating said shafts, all coacting substantially as described and for the purpose specified.

4. In a machine for bending or flanging sheet metal, the combination of a frame B having an open side; a suitable support therefor; shafts C, C', C'' and D, D', D'' arranged in pairs and supported in suitable bearings in said frame; bending-rolls *a, a', a''* having flanges formed at varying angles; bending-rolls *b, b', b''* cut away at varying angles to correspond to the flanges on said bending-rolls *a, a', a''*; pressure-rollers J supported in suitable bearings above said rolls *b, b', b''* and held normally against the same by spring-pressure; gear connections for said shafts; and means for rotating said shafts, all coacting substantially as described and for the purpose specified.

5. In a machine for bending or flanging sheet metal, the combination of a suitable frame; a suitable support therefor; shafts C, C', C'' and D, D', D'' arranged in pairs and supported in adjustable bearings in said frame; bending-rolls *a, a', a''* having flanges formed at increasing angles; bending-rolls *b, b', b''* cut away at angles to correspond to the flanges on said rolls *a, a', a''*; suitable gear connections for said shafts; stationary guide E for guiding the metal to be bent into the machine; tension-guides G for holding the metal in position in the machine; and means for rotating said shafts, all coacting substantially as described and for the purpose specified.

6. In a machine for bending or flanging sheet metal, the combination of a suitable frame; a suitable support therefor; shafts C, C', C'' and D, D', D'' arranged in pairs and supported in suitable bearings in said frame; bending-rolls *a, a', a''* having flanges formed at varying angles; bending-rolls *b, b', b''* cut away at angles to correspond to the flanges on said bending-rolls *a, a', a''*; pressure-rollers J supported in suitable bearings above said rolls *b, b', b''* and held normally against the same by spring-pressure; stationary guide E to guide the metal to be bent into the machine; tension-guides G to hold the metal in position in the machine; gear connections for said shafts; and means for rotating said shafts, all coacting substantially as described and for the purpose specified.

7. In a machine for bending or flanging sheet metal, the combination of a suitable frame; a suitable support therefor; shafts C, C', C'' and D, D', D'' arranged in pairs and supported in suitable bearings in said frame; bending-rolls *a, a', a''* having flanges formed at varying angles; bending-rolls *b, b', b''* cut away at angles to correspond to the flanges on said bending-rolls *a, a', a''*; pressure-rollers J supported in suitable bearings above said rolls *b, b', b''* and held normally against the same by spring-pressure; gear connections for said shafts; and means for rotating said shafts, all coacting substantially as described and for the purpose specified.

bending-rolls a, a', a'' having flanges formed at increasing angles; bending-rolls b, b', b'' cut away at angles to correspond to the flanges on said rolls a, a', a'' ; suitable gear connections for said shafts; stationary guides E for guiding the metal to be bent into the machine; tension-guides G for holding the metal in position in the machine; and means for rotating said shafts, all coacting substantially as described and for the purpose specified.

7. In a machine for bending or flanging sheet metal, the combination of a suitable frame; a suitable support therefor; shafts C, C', C'' and D, D', D'' arranged in pairs and supported in suitable bearings in said frame; bending-rolls a, a', a'' having flanges formed at increasing angles; bending-rolls b, b', b'' cut away at angles to correspond to the flanges on said rolls a, a', a'' ; suitable gear connections for said shafts; tension-guides G for holding the metal in position in the machine; and means for rotating said shafts all coacting substantially as described and for the purpose specified.

8. In a machine for bending or flanging sheet metal, the combination of a suitable frame; a series of bending-rolls arranged in pairs supported in adjustable bearings in said frame, and held normally apart by suitable springs, one roll of each pair having a flange at its outer end, and the other beveled at an

angle to correspond to such flange, the angles of the flanges of the several pairs increasing in degree, whereby the metal passing there-through is gradually formed into the desired shape in passing through the successive rolls; means for operating said rolls; and a tension-guide for holding the metal to be bent into said bending-rolls, as specified.

9. In a machine for bending or flanging sheet metal, the combination of a suitable frame; a series of bending-rolls arranged in pairs supported in suitable bearings in said frame, one roll of each pair having a flange at its outer end, and the other beveled at an angle to correspond to such flange, the angles of the flanges of the several pairs increasing in degree, whereby the metal passing there-through is gradually formed into the desired shape in passing through the successive rolls; means for operating said rolls, and a tension-guide for holding the metal to be bent into said bending-rolls, for the purpose specified.

In witness whereof we have hereunto set our hands and seals in the presence of two witnesses.

ARTHUR E. CHAMBERS. [L. S.]
LEWIS H. BULLARD. [L. S.]

Witnesses:

C. G. BULLARD,
J. E. TISCHNER.