(No Model.) 6 Sheets—Sheet 1.

H. A. SCHNEEKLOTH.

MACHINE FOR BENDING METAL BARS.

No. 468,582. Patented Feb. 9, 1892.

Fig: 1.

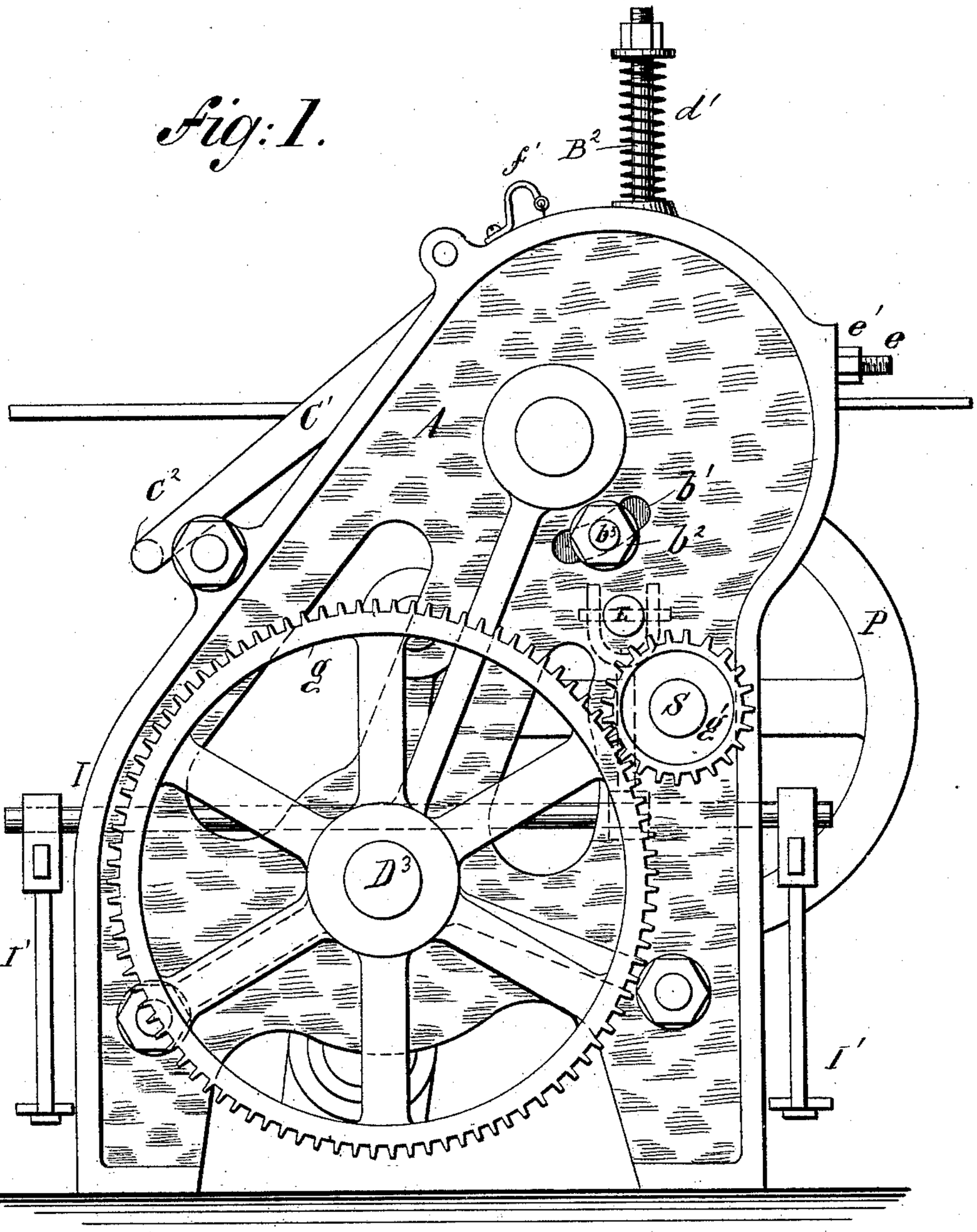

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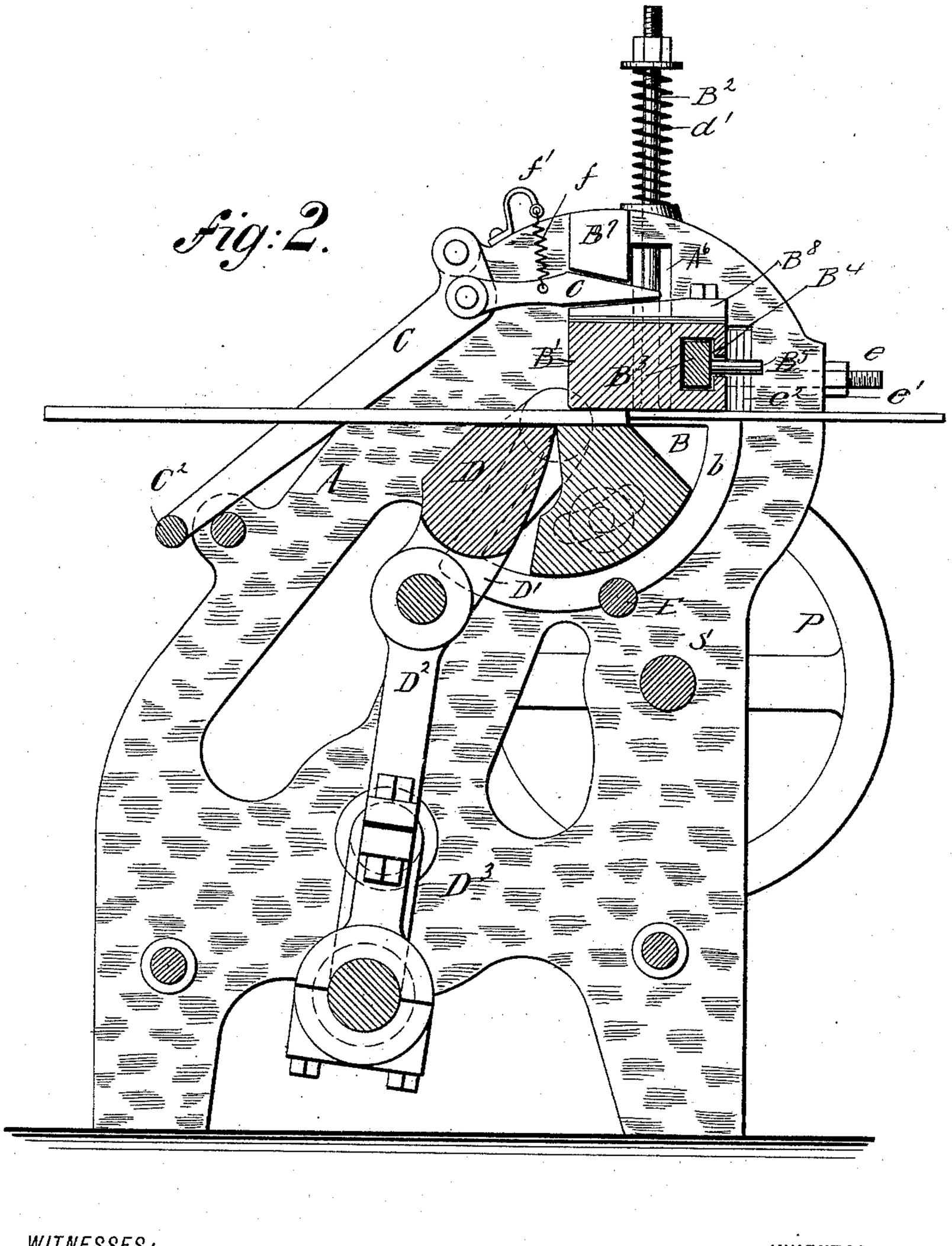
Fig: 2.



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MACHINE FOR BENDING METAL BARS.

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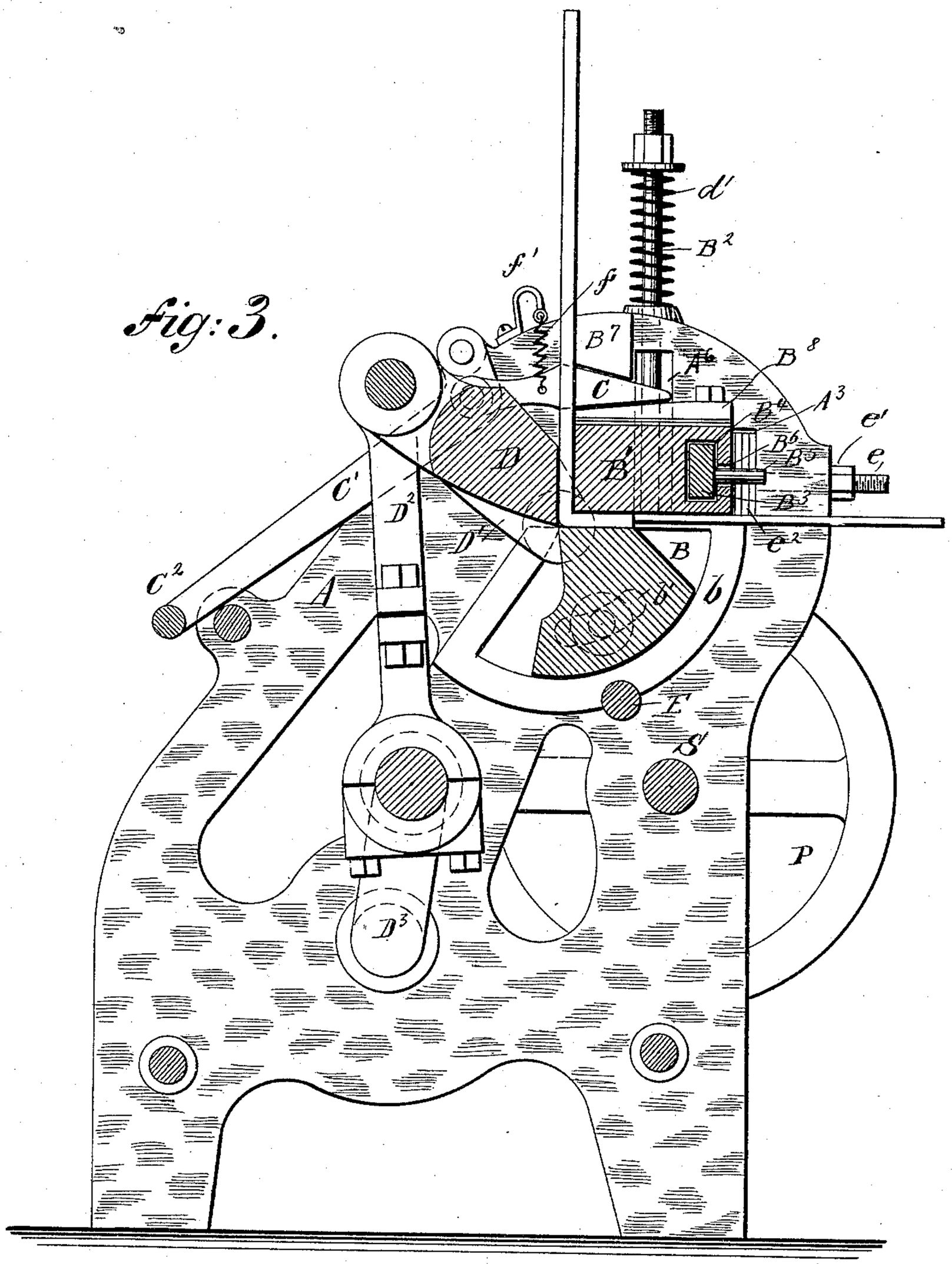
Fig: 3.



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MACHINE FOR BENDING METAL BARS.

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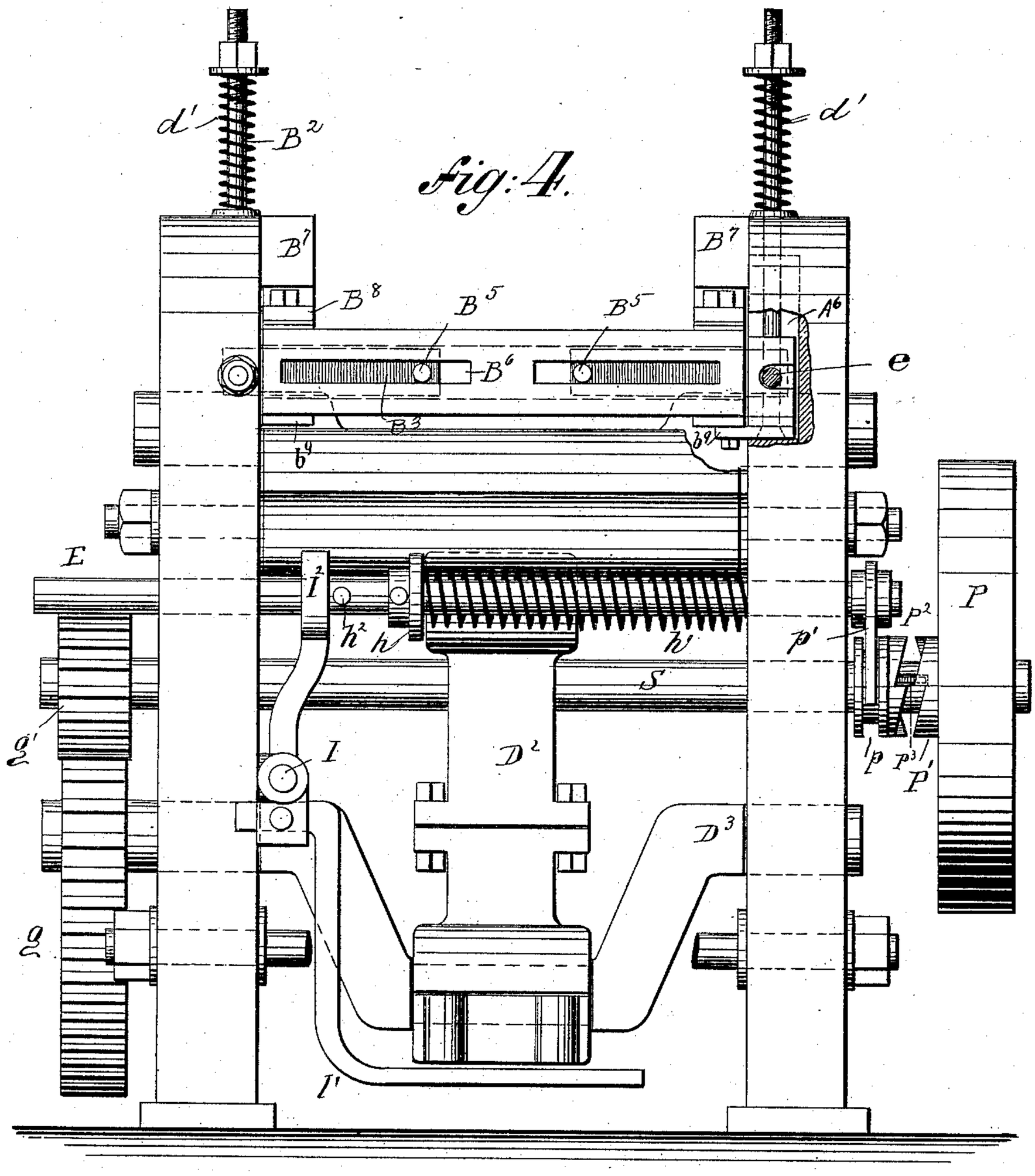
Fig: 4.



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MACHINE FOR BENDING METAL BARS.

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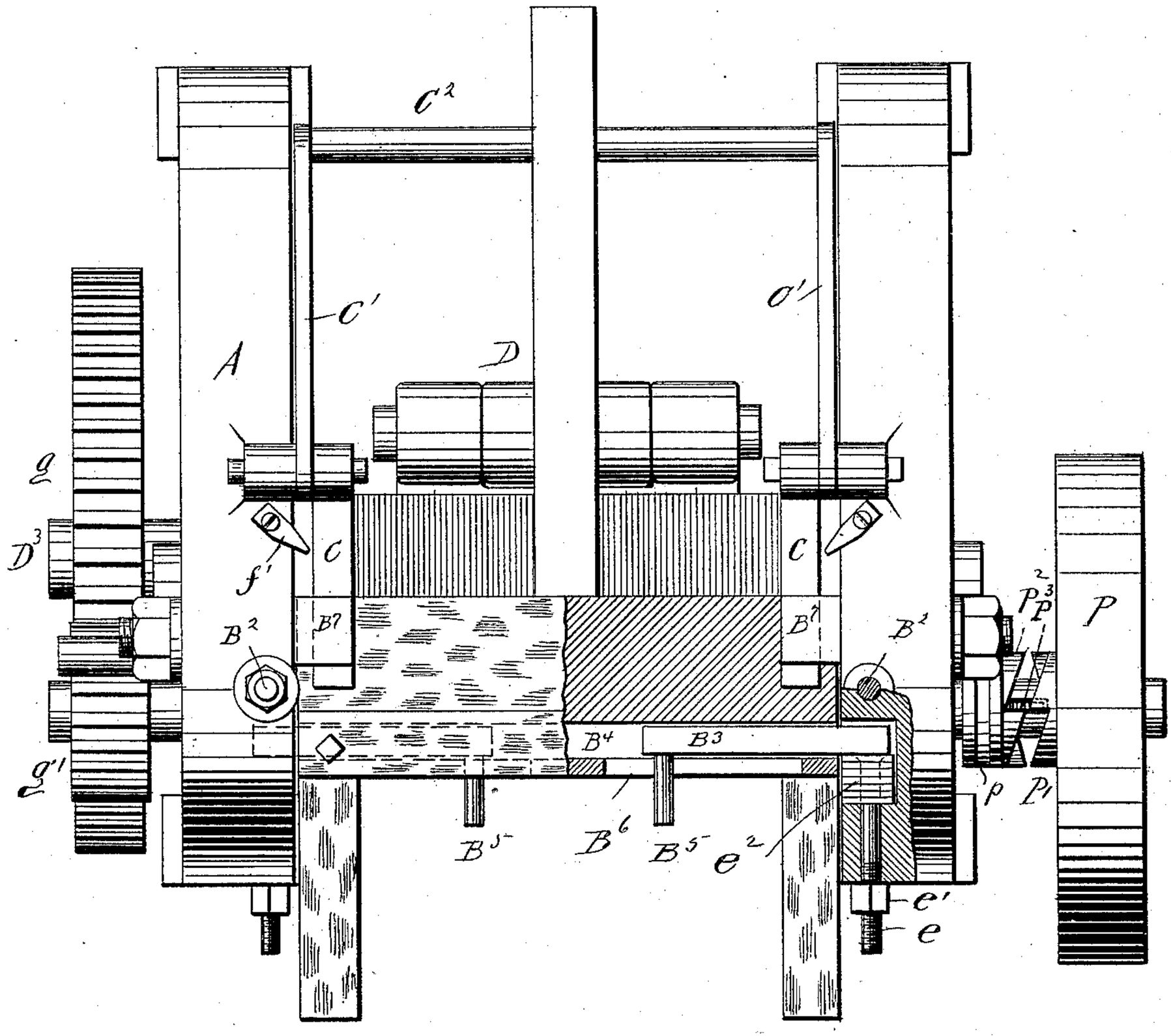
Fig. 5.



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MACHINE FOR BENDING METAL BARS.

No. 468,582. Patented Feb. 9, 1892.

Fig: 6.

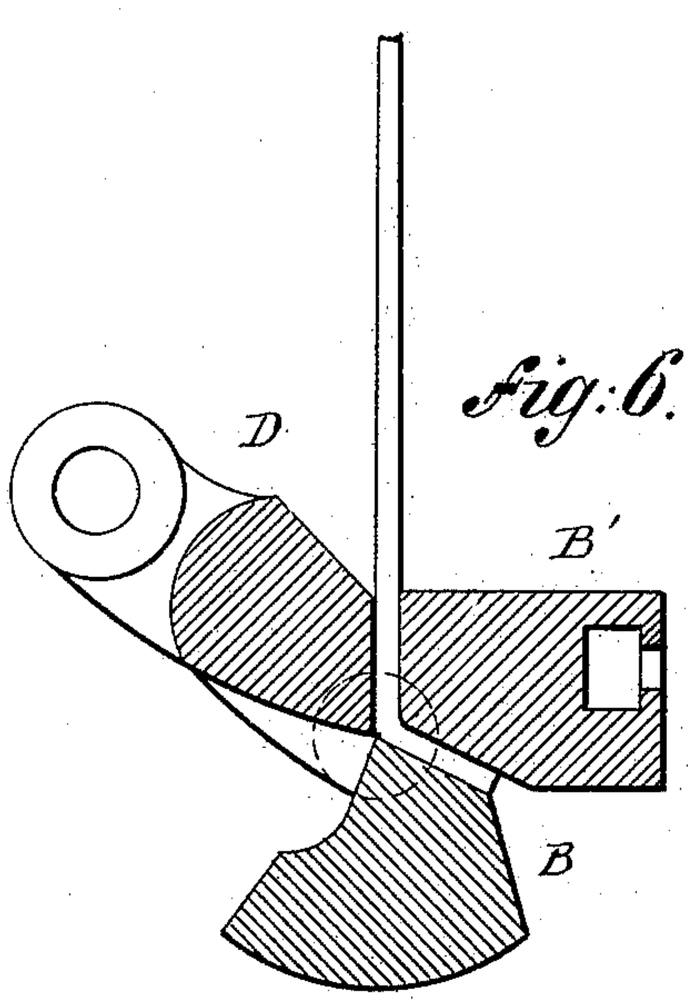


Fig: 7.

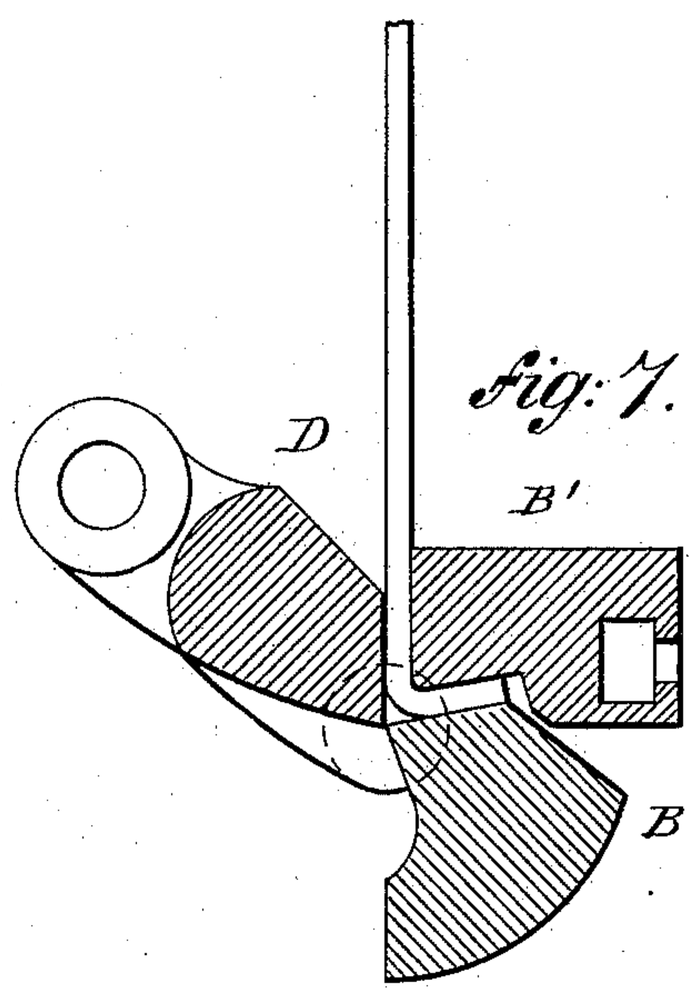
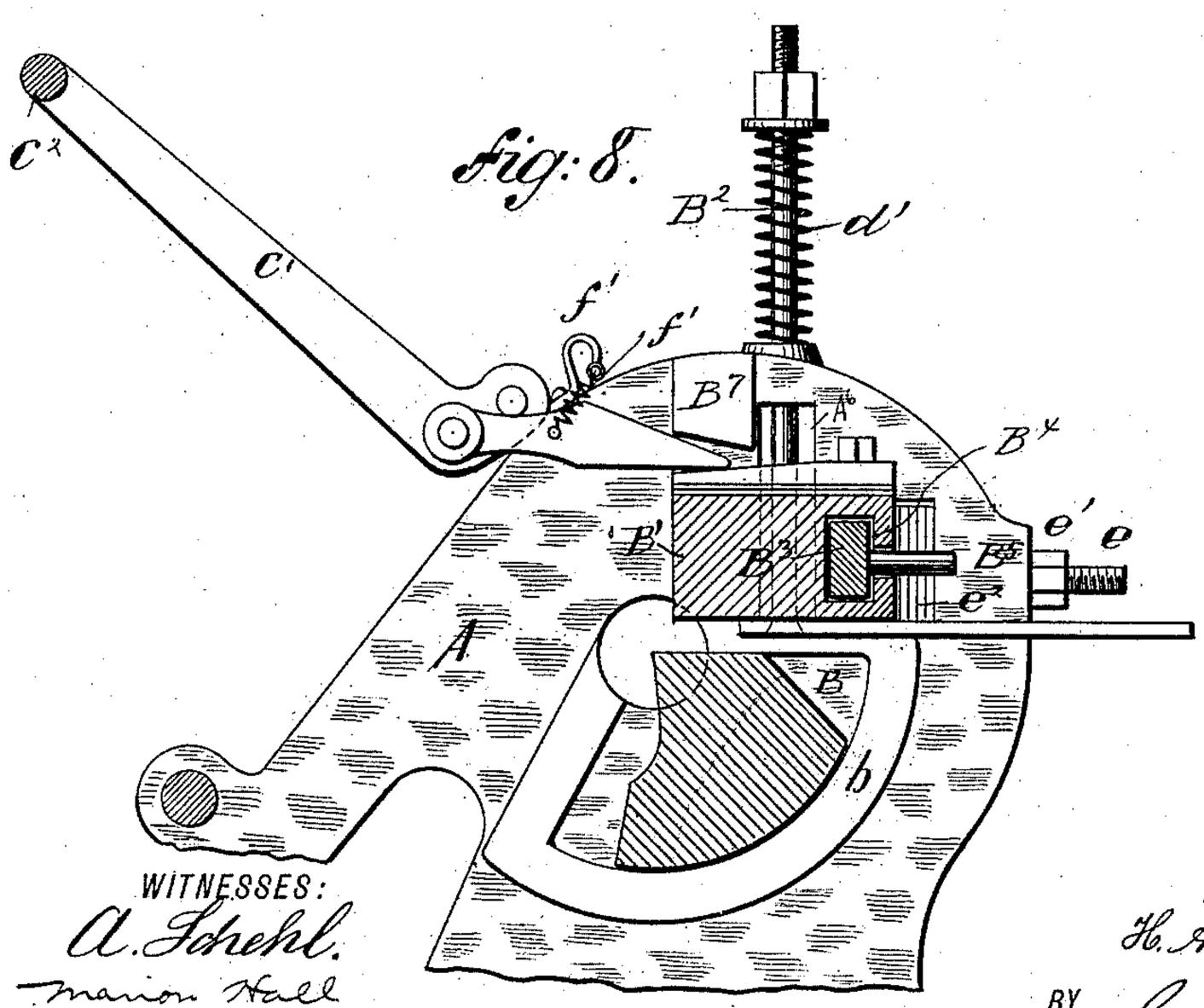


Fig: 8.



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UNITED STATES PATENT OFFICE.

HANS A. SCHNEEKLOTH, OF NEW YORK, N. Y.

MACHINE FOR BENDING METAL BARS.

SPECIFICATION forming part of Letters Patent No. 468,582, dated February 9, 1892.

Application filed September 12, 1891. Serial No. 405,515. (No model.)

To all whom it may concern:

Be it known that I, HANS A. SCHNEEKLOTH, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Machines for Bending Metal Bars, of which the following is a specification.

This invention has reference to an improved machine for bending metal bars or sheet-iron of all kinds at any suitable angle, as required for the special purpose for which the bars are intended in the arts, the bending operation being accomplished in a quick, uniform, and effective manner by a power-driven machine in which the jaws by which the bending operation is accomplished are readily adjusted, so as to bend the bars at right angles or at any other suitable angle, as required.

The invention consists of a machine for bending metal bars, which comprises a stationary holding-jaw, a spring-actuated jaw arranged above the same, means for locking and releasing said spring-actuated jaw, a movable bending jaw and a toggle-joint connected to said bending-jaw, and a rotary shaft by means of which the bending of the bar is accomplished in connection with the holding-jaws, as will be fully described hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation of my improved machine for bending metal bars. Figs. 2 and 3 are vertical longitudinal sections of the machine, showing the operative parts of the same respectively in position before and after the bending operation is accomplished. Fig. 4 is a front elevation of the machine, parts being broken away. Fig. 5 is a plan view of the same, also with parts broken away. Figs. 6 and 7 are detail sectional views of different shapes of holding-jaws, so as to bend the bars at angles of different degrees; and Fig. 8 is a vertical transverse section showing the mechanism by which the upper bar-holding jaw is raised, so as to permit the introducing and removing of the bar preparatory to and after the bending operation.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A A represent two upright supporting-standards, which are connected by a number of transverse stay-bolts, by which the required strength and rigidity are imparted to the standards A A. Between the upper parts of the standards A A are arranged two holding-jaws B and B′, the lower jaw B being supported adjustably between sector-shaped ribs *b b* of the standards A A, said jaws being preferably made of hardened cast-iron or other suitable material. The lower jaw B is provided at its ends with bolts b^3, that pass through arc-shaped slots *b′* of the standards A A, to the threaded ends of which are applied nuts b^2, by means of which and interposed washers the lower holding-jaw B can be readily adjusted and locked in any suitable position on the sector-shaped ribs *b b*, according to the angle to which the metal bars are to be bent. After the lower holding-jaw B is once adjusted in its proper position on the sector-shaped supporting-ribs *b b* it remains stationary and serves, by its upper surface, as a support for the bar that is to be bent.

At the ends of the upper jaw B′ blocks are arranged, with the lower parts of which the ends of the jaw B′ are connected by pieces b^9, said blocks being located in recesses A^6 of the standards A, in which recesses they can move up and down. Vertical rods B^2 are connected with said blocks and pass through the upper part of the standards A A, said rods being threaded at their upper ends and provided with nuts and washers, between which and bosses at the top parts of the standards A A are interposed helical springs *d′*, which are of sufficient strength to produce the lifting of the upper jaw B′ whenever the same is released from a mechanism by which the same is rigidly held in its lowermost locked position. The upper holding-jaw B′ is made of oblong shape, its lower front edge being either made in the form of a right angle, as shown in Figs. 2 and 3, or in the form of an obtuse angle, as shown in Fig. 6, or in the form of an oblique angle, as shown in Fig. 7, accordingly as the bars are to be bent at right angles, or at an obtuse angle, or at an oblique angle.

At the rear part of the upper holding-jaw B′ are arranged recessed ways B^4, in which

are guided two retaining sliding bolts B^3, which are provided with pins B^5, that project through longitudinal slots B^6 at the rear part of the holding-jaw B′, said sliding bolts being adapted to be moved lengthwise, so that their outer ends pass into the recess A^3 of the standards A A, whereby they hold the jaw B′ in place between the jaws and prevent a movement of said jaws transversely to its longitudinal axis. After the sliding bolts B^3 have been placed into this position they are retained in place by means of locking-bolts *e*, which are arranged in recesses of the standards at right angles to the sliding bolts, as shown in Fig. 5, a number of recessed washers e^2 being interposed between the sliding bolts and the rear parts of the recesses, so that any lost motion of the upper holding-jaw B′ is compensated and the same held by the interposed washers and the locking-bolts *e* and nuts *e′*, applied to the threaded outer ends of the latter, rigidly in position. The interposed washers serve for setting the upper holding-jaw B′ in its proper relative position toward the lower jaw and serve, also, to arrange the position of the jaw B′ for different thicknesses of bars which are to be bent in the machine. The upper jaw B′ is provided with a top plate B^8, which is slightly beveled toward the upper front edge of the jaw, so that it serves, in connection with projections B^7, that are cast integral with the standards A A, and which projections are beveled at their lower edge, for guiding wedge-shaped keys C, which are pivoted to angle-levers C′, that are pivoted to the standards A A at their upper ends and connected at their lower ends by a transverse handle-bar C^2, by means of which the wedge-shaped keys C are either pushed inward along the inclined top plate B^8 and projections B^7, as shown in Figs. 2 and 3, or withdrawn from the same, so as to release the upper holding-jaw B′, as shown in Fig. 8.

For operating the wedge-keys C the lever-frame C′ C^2 is placed either in its lowermost position, so as to rest on one of the transverse stay-bolts of the standards A A, as shown in Fig. 2, or lifted into its uppermost position, as shown in Fig. 8. The wedge-keys C are connected by spiral springs *f* with bent arms *f′*, that are attached to the upper parts of the standards A A, which springs serve for the purpose of retaining the wedge-keys C in contact with the lower inclined faces of the projections B^7, so as to permit the reliable entering of the wedge-keys over the top plate of the jaw B′ or the withdrawal of the same in following the motion of the operating-lever frame C′ C^2. When the wedge-keys are moved inwardly, they press the upper holding-jaw B′ against the tension of its springs *d′* in downward direction, while when the wedge-keys are withdrawn the springs lift the jaw B′ sufficiently to permit the introduction of the bar to be bent between the lower stationary jaw B and the upper jaw B′. As soon as the bar is introduced the wedge-keys are forced in, so that the upper jaw B′ is lowered and presses the end of the bar tightly against the face of the stationary jaw B, in which position the bar is ready for the bending operation. This is accomplished by means of a bending-jaw D, which extends transversely between two links D′, that are pivoted at their upper ends to bearings of the standards A A and at their lower ends to a toggle-lever D^2, that is pivoted at its lower end to a crank-shaft D^3, the ends of which are supported in bearings at the lower parts of the standards A A, the links D′ and the lever D^2 forming a toggle-lever that is actuated by the rotating crank-shaft D^3. Rotary motion is imparted to the crank-shaft D^3 by means of a gear-wheel *g*, that is keyed to the outer end of the same, which gear-wheel receives motion from a pinion *g′* on a driving-shaft S, that is supported in bearings of the standards A A, and to which motion is transmitted by a suitable belt-and-pulley transmission.

To the transmitting-pulley P the fixed member P′ of a clutch is applied, the loose member P^2 of which is placed on the driving-shaft S and provided with a grooved sleeve *p*, that is engaged by a forked arm *p′*, which is attached to the outer end of a transversely-guided bar E, which passes through holes of the standards A A, and is provided intermediately between the same with a fixed collar *h*, between which and one of the standards a strong spiral spring *h′* is introduced.

P^3 is a cushion-spring interposed between the loose member of the clutch and the shaft to prevent undue jolts and jars. A pin h^2 on the transverse slide-rod H is engaged by the fork I^2 of a rocking shaft I on one standard A and provided at the front and rear end of the machine with a treadle I′, as shown in Fig. 1, so that the starting or stopping of the machine can be accomplished from the front or rear part of the machine, according to the nature of the bending operations that are performed, and according as the bars have to be introduced from the front or rear end of the machine. As soon as treadle I′ is lowered by the foot of the operator the transverse slide-rod E is pushed lengthwise by the fork I^2 against the tension of the spring *h′*, so that the movable member of the clutch is moved into engagement with the fixed member of the clutch on the driving-pulley P, whereby rotary motion is transmitted by the driving-shaft S to the crank-shaft D^3, and thereby by the action of the toggle-levers the bending-jaw moved from its lowermost position on a level with the stationary jaw B into a position in front of the upper jaw B′, as shown, respectively, in Figs. 2 and 3. The lower front edge of the upper jaw B′ forms the edge on which the bending operation is performed and against which the bending-jaw has to press

the bar when the bending operation is completed. When the bending-jaw has arrived in its uppermost position in front of the upper jaw B′, the motion of the crank-shaft is completed and thereby the bending-jaw returned into its normal position, ready for the next bending operation. For this purpose, however, it is necessary to release the bar which has just been bent by the action of the holding and bending jaws, which is accomplished by raising the lever-frame C′ C^2 into the position shown in Fig. 8, so that the wedge-keys are withdrawn, which permits the lifting of the upper holding-jaw B′ by the action of its supporting-springs, so that the end of the bar is released, and thereby the latter can be removed freely from the holding-jaws. The next bar is then inserted between the holding-jaws B B′ and the wedge-keys pushed forward by the action of their lever-frame into backward position, so as to lower the upper holding-jaw and clamp the bar firmly between the stationary jaw and the upper jaw. The treadle is then actuated and the motion of the bending-jaw accomplished by the toggle-levers, which are operated by the driving mechanism described. After each full rotation of the crank-shaft D^3 the treadles I′ are released and thereby the members of the clutch disconnected, so that the pulley P turns loosely on the driving-shaft S, whereby the motion of the transmitting mechanism is stopped.

By the joint action of the holding-jaws B B′ and the bending-jaws operated by the toggle-lever of the driving mechanism described bars of considerable size can be bent to any suitable angle in a quick and accurate manner, so that the machine forms a valuable implement for metal-workers and a useful auxiliary for bending metallic bars of all kinds.

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

1. In a machine for bending metal bars, the combination, with a frame, of a lower holding-jaw mounted adjustably in said frame, an upper holding-jaw mounted vertically movable in said frame, means for locking the upper jaw in place, a bending-jaw held between pivoted links, and means for turning said links on their pivots, substantially as set forth.

2. In a machine for bending metal bars, the combination, with two standards having sector-shaped ribs, of a lower holding-jaw mounted adjustably on said ribs, a vertically-movable upper holding-jaw, a bending-jaw held between pivoted links, and means for turning said links on their pivots, substantially as set forth.

3. In a machine for bending metal bars, the combination, with two standards, of a lower adjustable holding-jaw between the standards, a vertically-movable upper holding-jaw, slide-bolts in said jaw for engaging parts of the standards and preventing movement of the upper holding-jaw transversely to its longitudinal axis, and a swinging bending-jaw and means for bending the same, substantially as set forth.

4. In a machine for bending metal bars, the combination, with an adjustable lower holding-jaw, of a vertically-movable upper holding-jaw, a spring for drawing the upper holding-jaw upward, wedge-keys for forcing it downward, and a swinging bending-jaw, substantially as set forth.

5. In a machine for bending metal bars, the combination, with two standards, of an adjustable lower holding-jaw, a vertically-movable upper holding-jaw, beveled top plates on the same, wedge-keys for pressing the upper holding-jaw downward, beveled projections on the frame, against which said wedge-keys can rest, and springs for drawing the upper holding-jaw upward, substantially as set forth.

6. In a machine for bending metal bars, the combination of an adjustable lower holding-jaw, a vertically-movable upper jaw, springs for drawing the upper jaw upward, wedge-keys for pressing the upper jaw downward, and a swinging frame to which said wedge-keys are fixed, substantially as set forth.

7. In a machine for bending metal bars, the combination, with two standards, of a lower holding-jaw, a vertically-movable upper holding-jaw, springs for drawing the upper jaw upward, wedge-keys for pressing the upper holding-jaw downward, a swinging frame to which said wedge-keys are pivoted, and springs for drawing said wedge-keys upward, 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.

HANS A. SCHNEEKLOTH.

Witnesses:
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A. M. BAKER.