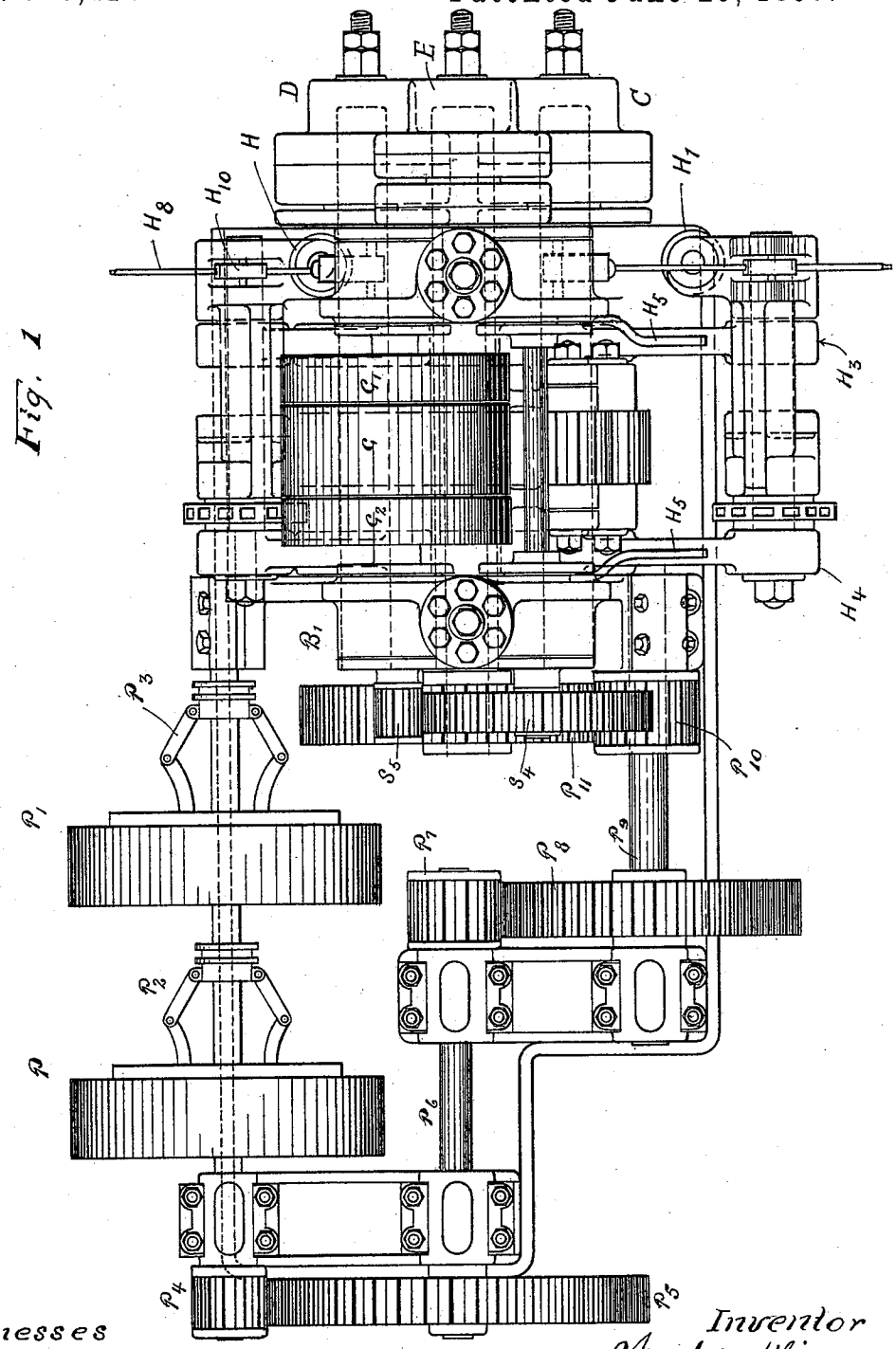
(No Model.) 4 Sheets—Sheet 1.

C. KLING.

METAL BENDING MACHINE.

No. 585,214. Patented June 29, 1897.

Fig. 1



Witnesses

Frank H. Deane.

L. W. Murphy.

Inventor

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By W. E. Williams Atty.

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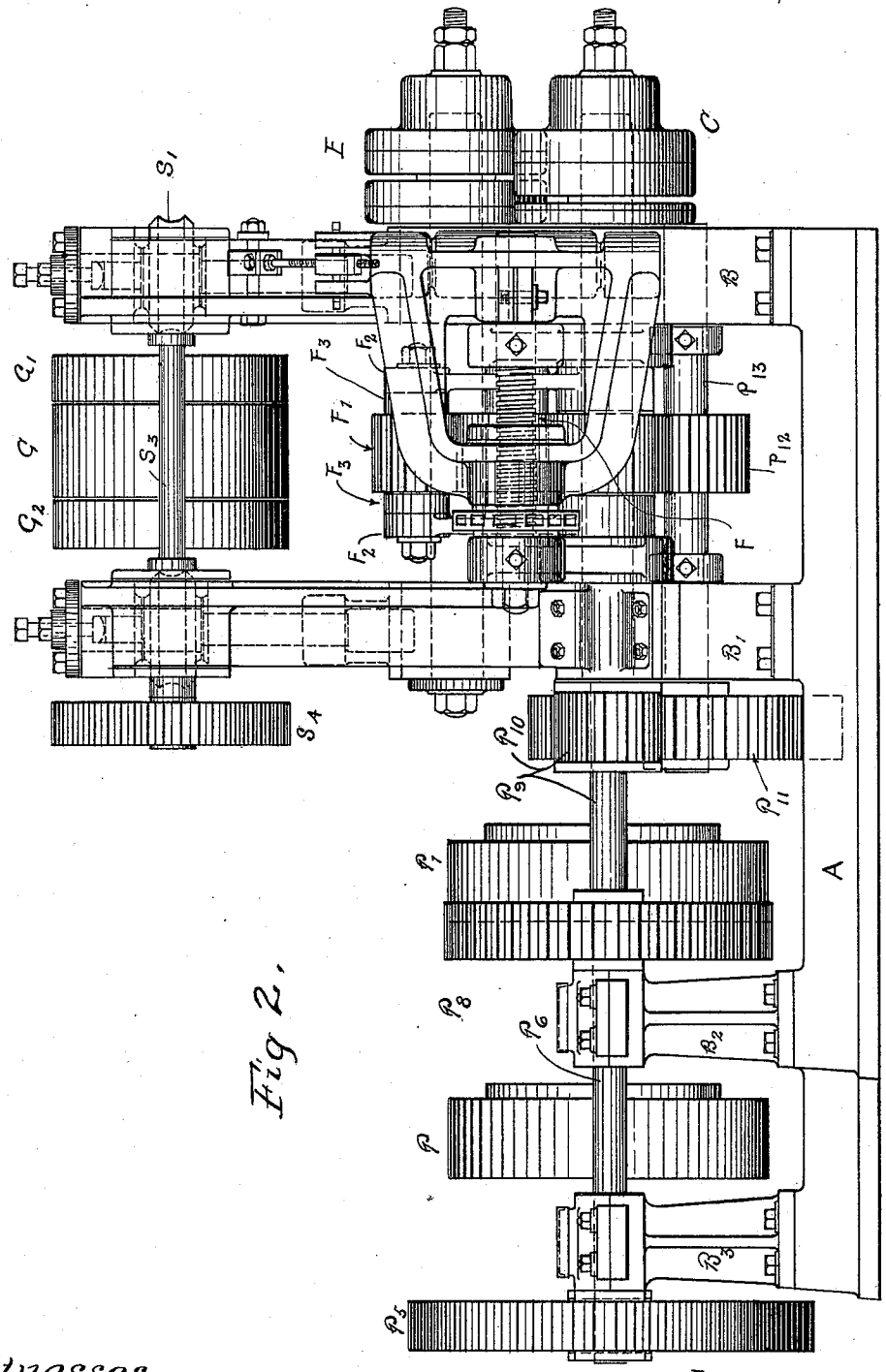

Fig 2.

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(No Model.)

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Fig. 3.

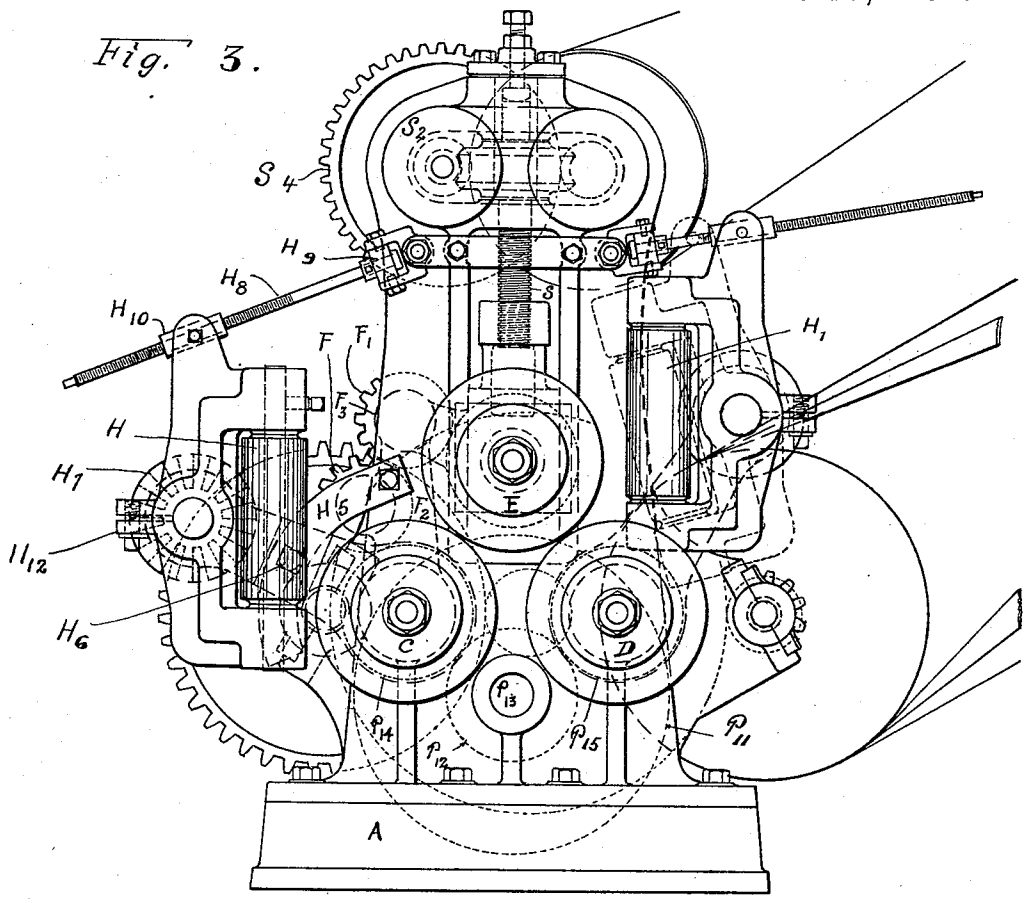


Fig. 5

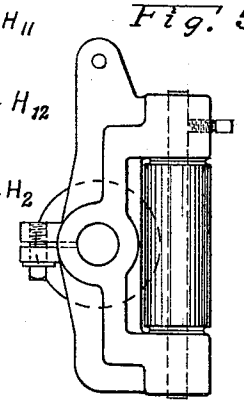
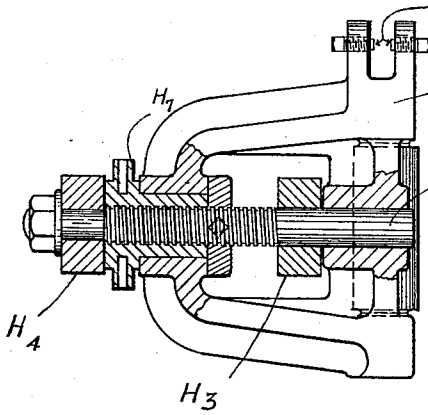


Fig. 4.



Witnesses

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(No Model.) 4 Sheets—Sheet 4.

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Fig. 6.

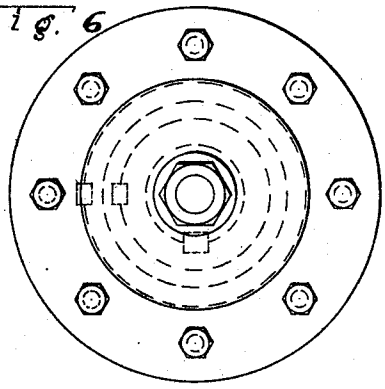


Fig. 8.

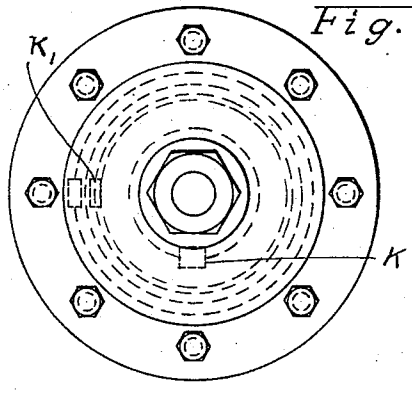
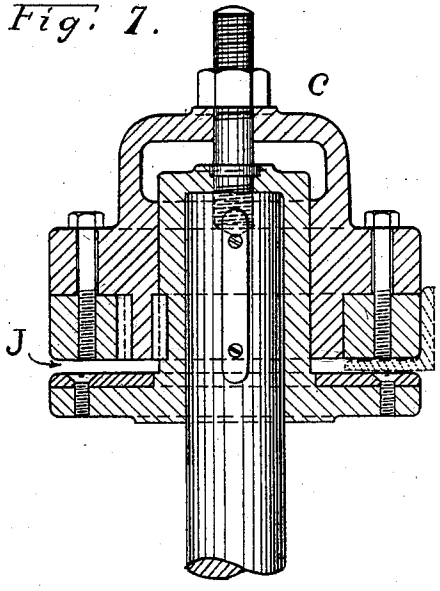
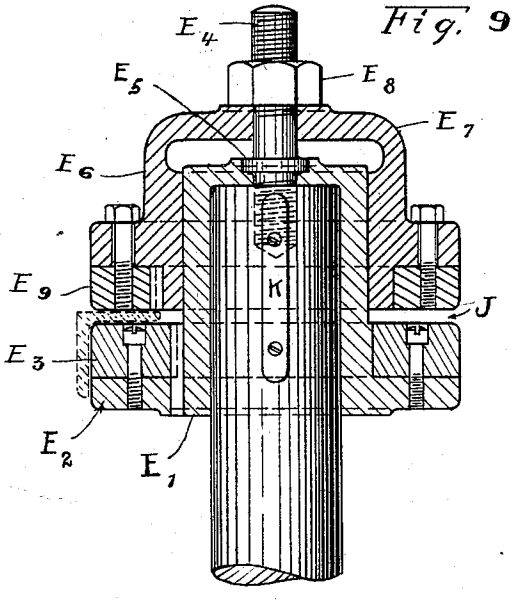


Fig. 7.



E

Fig. 9.



Witnesses
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By W. E. Williams Atty.

UNITED STATES PATENT OFFICE.

CHARLES KLING, OF CHICAGO, ILLINOIS.

METAL-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 585,214, dated June 29, 1897.

Application filed April 15, 1896. Serial No. 587,595. (No model.)

To all whom it may concern:

Be it known that I, CHARLES KLING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Bending Bars Having Flanged Sections, of which the following is a specification.

The object of the invention is to provide a machine adapted to bend perfectly a variety of plane-faced bars or beams, and especially flanged beams.

In the accompanying drawings, Figures 1, 2, and 3 are respectively a plan, a side elevation, and a front elevation of a machine embodying my invention. Fig. 4 is a view, partly in section, illustrative of devices concerned in adjusting the guide-rollers. Fig. 5 shows the devices of Fig. 4, looking toward the left in that figure. Figs. 6 and 7 are respectively an end view and an axial section of one of the bending-rolls. Figs. 8 and 9 are figures showing, respectively, an end view and an axial section of one of the other bending-rolls, which differs slightly from the roll shown in Figs. 7 and 8.

In the drawings, A B B′ B^2 B^3 is a rigid frame supporting the working parts of the machine, and C D E are bending-rolls mounted upon the free projecting ends of shafts carried by the frame. Power is applied to the machine by belt-pulleys P P′, rotating in opposite directions and alternately engaging their common shaft by means of clutches P^2 P^3, without novelty. This shaft in rotating imparts motion to the twin rolls C D by means of an ordinary train of gearing P^4 P^5 P^6 P^7 P^8 P^9 P^{10} P^{11} P^{13} P^{12} and P^{14} P^{15}, the last two elements being equal gears upon the shafts of the rolls C D, respectively. The shafts last mentioned rotate in fixed bearings in the frame, while the shaft of the third roll E is mounted in bearings arranged to slide vertically in the frame and is raised and lowered parallel to itself by two screws S, connected with said bearings and having themselves rotary motion only. The screws are rotated equally and synchronously by a power-pulley G, driven at will in either direction by shipping upon it one or the other of two oppositely-moving belts normally running upon two idle-pulleys G′ G^2, respectively. The motion of the pulley is transmitted to the screws through the pulley-shaft, gears S^5 S^4, shaft S^3, worms S^2, and worm-wheels S′ upon the screws, respectively.

The roll E is driven from the shaft of the roll C by means of gears P^{14} F F′ X, the latter being upon the shaft of the roll E. The gears F F′ are carried by links F^2 F^3, swinging about the axes, respectively, of the shafts C E. Obviously vertical adjustment of the roll E changes the relative positions of the gears which drive it, but does not interfere with their engagement. Each roll is transversely divided and the separation of the parts forms a slot J to receive the flange, if there be a flange, upon the beam to be bent. One part of each roll is rigidly fixed to the shaft, and means are provided for moving the other part longitudinally of the shaft to vary the width of the slot, so that it may closely fit any flange or may be closed entirely, if desired.

The rolls C D are alike, and the roll E differs from them only in the location of the slot, and hence only the roll E (shown in Figs. 8 and 9) will be described in detail. Upon the free end of the roll-shaft is a cup-like sleeve E′, formed integrally with the part E^2 of the transversely-divided roll and rigidly fixed to the shaft by means of a flanged bolt E^4 and a spline K. Upon this sleeve is a second sleeve E^6, rigidly connected with the other portion of the roller and projecting beyond the end of the shaft. This second sleeve slides upon the first, but is prevented from rotating thereon by a key K′. A plate E^7 extends across the outer end of the sleeve E^6, and through it passes the free end portion of the bolt E^4. A nut working upon the bolt serves for adjusting the distance between the parts of the roll, and it is obvious that whatever space-widening strain is exerted by a bending flange lying in this space no end thrust of the shaft results.

The meeting faces of the divided roll are provided with annular facing-blocks E^8 E^9, of steel, which form the parallel plane walls of the slot J. They are both removable and reversible, and the working angles of each may be one rounded, one sharp, as shown, or may have such other form as may be desired or needed to fit the flanged beam or angle-iron to be bent.

It is evident that by means of the bolt E^4 the roll can be readily adapted for bending an internal or an external flange having width and thickness within reasonable limits.

To avoid "wind" in the beam operated upon—that is, to keep its faces in their normal planes—cylindrical rollers H H′ are mounted, respectively, alongside the path of the entering beam and alongside the path taken by it in leaving the rolls. The rollers are so arranged that their axes are always parallel to the plane of the bending-rolls, but provision is made for adjusting the distance of each from that plane for raising and lowering each bodily and for varying the inclination of each in its own plane. The mounting of the two rollers being similar that of one only will be described. The roller H is revolubly mounted in a forked bearing H^{12}, which is itself revolubly adjustable upon a shaft H^2, parallel to the roll-shafts, and carried by links H^3 H^4, mounted to swing about the axis of the shaft of the roll C. As the shaft H^2 swings with its links the roller H will be raised or lowered, as the case may be.

At the upper side of the bearing H^{12} is pivoted a nut H^{10}, in which works a threaded rod H^8, having one end swiveled and pivoted in a yoke H^9, pivoted to the main frame. By rotating this rod while the shaft H^2 is stationary the inclination of the roller is changed. The shaft H^2 is fixed in any desired position by means of a set-screw H^6, working in one of the links against a bar H^5, which slides in a slot in the link and is secured at one end to the main frame. A portion of the shaft H^2 is threaded, and upon this portion works a nut H^7, arranged to carry with it the bearing H^{12}, and thus to adjust the distance of the roller from the plane of the bending-rolls.

It is to be observed that the two rollers are independent and that therefore the pressure exerted by them upon the beam may have any desired ratio that the exigencies of the particular case may require. If it be considered that proper working of the rollers depends upon their being perpendicular to the direction of the impinging beam and that the direction of the beam and the location of its path both vary very greatly under the varying conditions of practical work, the importance of each adjustment will be evident.

What I claim is—

1. The combination with a set of bending-rolls, of a guide mounted alongside the entering path of the member to be bent, a second guide placed alongside the leaving path of said member, means for independently adjusting the distance of the guides from the plane of the bending-rolls, and means for independently moving each guide bodily, with its axis, parallel to the plane of the rolls.

2. The combination with a transversely-divided bending-roll, of the annular, detachable and reversible facing-blocks secured to the parts, respectively, and each facing the plane of division and having its opposite working faces unlike.

3. The combination with the three bending-rolls, of a guide-roller mounted alongside the plane of said rolls with its axis parallel to said plane, and means for swinging the roller bodily about the axis of one of the rolls.

4. The combination with three bending-rolls in a plane, of a guide-roll mounted parallel to that plane, means for varying its distance from that plane, means for raising and lowering it in its own plane, and means for varying its inclination in its own plane.

5. The combination with the bending-rolls of a cylindrical guide-roller alongside the entering path of the member to be bent, a like roller alongside the leaving path of said member, means for independently moving said rollers bodily, with their axes, in planes parallel to the plane of the bending-rolls, and means for independently adjusting the distance of each from the latter plane.

In witness whereof I have hereunto subscribed my name, on this 2d day of April, in the presence of two subscribing witnesses.

CHARLES KLING.

Witnesses:
OLOF KLING,
F. H. DEANE.