B. J. EDEMA.

BENDING DIES.

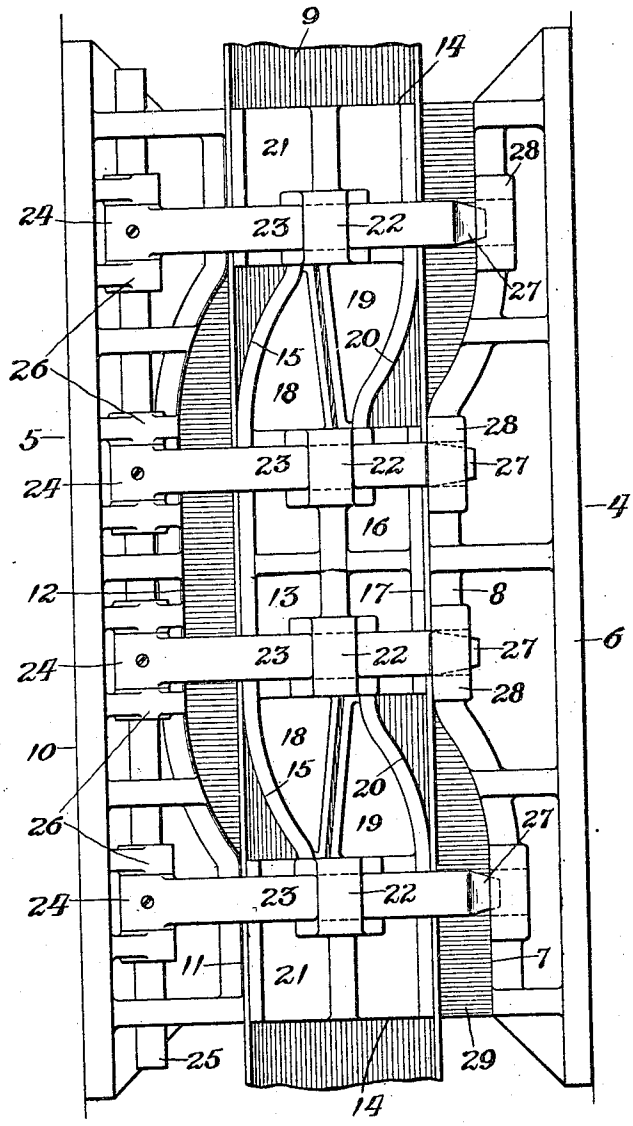
APPLICATION FILED APR. 30, 1909.

950,167.

Patented Feb. 22, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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2 SHEETS—SHEET 2.

Fig. 2.

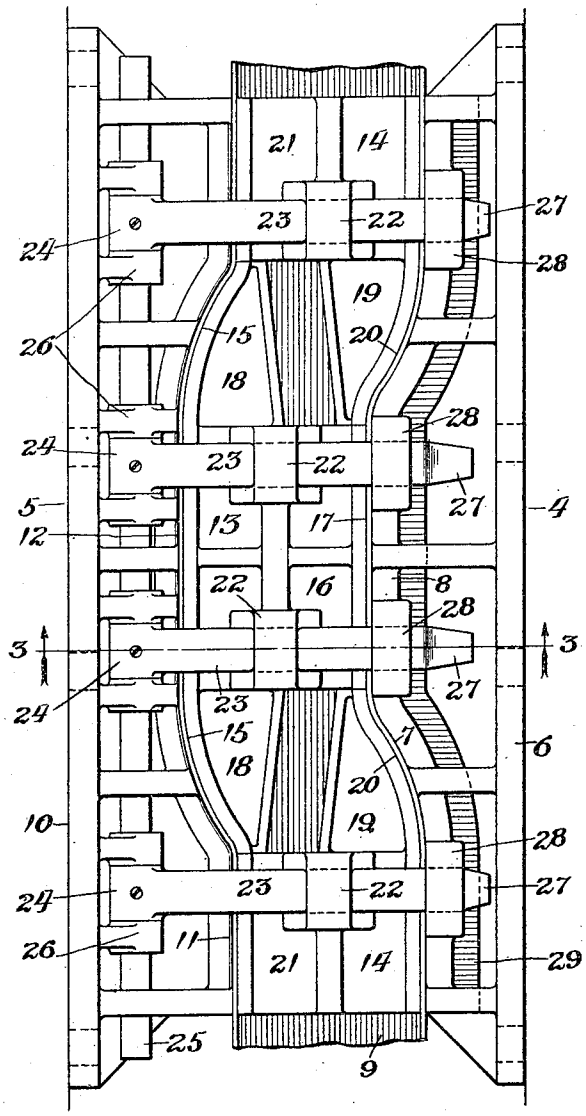
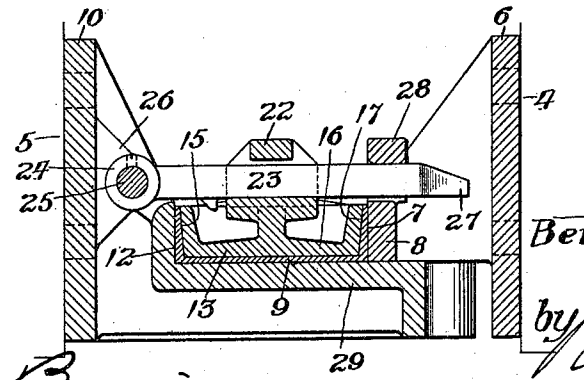


Fig. 3.



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UNITED STATES PATENT OFFICE.

BERTUS J. EDEMA, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN CAR & FOUNDRY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

BENDING-DIES.

950,167. Specification of Letters Patent. Patented Feb. 22, 1910.

Application filed April 30, 1909. Serial No. 493,145.

To all whom it may concern:

Be it known that I, BERTUS J. EDEMA, a subject of the Queen of the Netherlands, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Bending-Dies, of which the following is a specification.

This invention is devised primarily for the purpose of bending a bend in a piece of channel iron.

The object of the invention is to so arrange the die members that the work will be reinforced from within during the bending operation in order to prevent buckling or distortion to the flanged metal which would take place if suitable reinforcement were not provided.

A further object of the invention is to so arrange the die members that they can be easily lifted away from the work after each operation, thereby enabling the die members to be readily returned to open position in preparation for the insertion of a new piece of work.

Further objects will appear from the detailed description of the invention, which consists in features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a plan view of the die members in their initial position, showing a straight section of work in place; Fig. 2, similar view, showing the die members in their final or closed position; Fig. 3, a cross sectional view taken on line 3—3 of Fig. 2.

The bending die as a whole comprises a male die member 4 and a female die member 5. The male die member is in the form of a ribbed casting, having a straight outer face 6 and an acting inner face 7, provided in the center with an inwardly rounded boss or elevation 8, which is adapted to act against the flange of the interposed channel beam 9. The female die is formed to have a straight outer face 10 and an inner or acting face 11, provided at center with a curved recess or depression 12, into which the work will be driven by the advance of the male die section. The facial curvature of the male and female die members is such that the channel beam, which constitutes the work, will be given the desired bend or offset.

The male and female die members coöperate with interior reinforcing die members which are adapted to lie within and act against the inner faces of the flanges of the channel beam. As shown, these reinforcing die members comprise a center male die member 13 and lateral female die members 14. The male reinforcing die member is provided with an acting face 15, having a curvature commensurate with the curvature of the main female die member with which it coöperates in the bending of the interposed flange of the work.

The male reinforcing die member is further provided at its center with rearwardly projecting center die block 16, having a straight acting face 17, which butts against the inner face of the rear flange of the work and coöperates with the center portion of the main male die member.

The center die block 16 is of less length than the main portion of the die member on which it is formed, the formation being one to afford beveled offset faces or shoulders 18 on each side of the center block.

The lateral female die members 14 each comprise an inwardly projecting portion 19, provided with an acting face 20, having a curvature commensurate with the curvature of the main male die member at the point where the straight faces 7 on each side of the main male die member round up and merge into the center boss 8. The lateral female die members 14 further comprise a main or body portion 21 of substantially rectangular formation and of the full interior width of the work, the straight faces of which bear against the flanges of the work on each side of that portion which is intended to be bent by the action of the dies. The formation is such that the inwardly projecting portions of the reinforcing female die members complement the outwardly projecting portions of the male reinforcing die member, and fit together with sufficient compactness to permit the members when in initial or closed position to lie between the flanges of the work as shown in Fig. 1.

In order to facilitate the adjustment of the reinforcing die members, each of the latter is provided with one or more bored lugs 22, through each of which is entered a swinging arm 23, provided at its inner end with a journal sleeve 24, through all of which sleeves is entered a journal shaft 25, which is supported by bracket lugs 26 cast, or otherwise formed, on the female die mem-

ber. The free ends 27 of the swinging arms 23 are beveled or tapered to afford an easy entrance through a plurality of bored lugs 28 formed on the main male die member, whereby all of the die members will be properly supported and centered with respect to one another during the progress of the work.

The female die member is built up from a floor plate 29, over which the acting portion of the main male die member travels, which floor affords a suitable support or foundation for the work; and it will be understood that the various members are hollowed out and ribbed as is usual in the casting of such constructions in order to lighten the metal to the desired extent without sacrificing the necessary strength and rigidity.

In use, in order to position a section of channel iron, the hinged arms 23 are turned back, carrying with them the reinforcing male and female die members. Thereafter the main male die member is moved back to the extent necessary to permit the insertion of a straight beam or section of channel iron, as shown in Fig. 1. The reinforcing male and female die members are then compressed or fitted together so as to rest in the channel in the work between the flanges. Thereafter the advance of the main male die section causes the bored lugs 28 to engage the ends of the swinging arms and locks the same in position to hold all of the die members in perfect registration with one another. As the main male die member advances, it will force forward the male reinforcing die member, the acting face of which will coöperate with the main female die member.

The center or body portion of the male reinforcing die member, occupying as it does, the full space between the flanges of the work, will fully and completely reinforce the work at its center point and hold the flanges and the web of the work clamped firmly in position during the advance of the dies. The reinforcing female die members meanwhile will clamp the work firmly at points adjacent to the bent portion, so that the inwardly projecting portions of the female reinforcing die members will be firmly braced and held to coöperate with the main male die member in the intended manner. As the main male die member advances, the reinforcing die members will be spread apart as indicated in Fig. 2, so that in their ultimate positions of adjustment their acting faces will lie in an unbroken line along the inner faces of the flanges and in register with the adjacent main die members. In this manner the work will be firmly clamped and reinforced during the bending process, with the result that even extremely thin metal can be acted upon in the manner described without any buckling or unintentional distortion of the work.

The arrangement is one which forms a firm, rigid, and compact structure, which may be mounted in any suitable device, such as a bull-dozer, whereby the necessary pressure can be applied.

What I claim as new and desire to secure by Letters Patent:

1. In bending dies the combination of a main male die member and a main female die member and reinforcing male and female die members adapted when the main dies are in open position to fit into one another and adapted to open away from one another by the closing of the main dies.

2. In bending dies the combination of main male and female die members and reinforcing male and female die members, the male reinforcing die member occupying a position intermediate the two female reinforcing die members and adapted to have its acting face moved away from the acting face of the female reinforcing die members by the closing of the main dies.

3. In bending dies the combination of main male and female die members adapted to act upon the outer faces of a channel beam, a reinforcing male die member of a width in part to fill the space between the flanges of the channel beam and in part of a less width, and a reinforcing female die member of a width in part to fill the space between the flanges and of less width in part; the narrower portions of the two reinforcing die members adapted to overlap and the reinforcing male die member being positioned to be moved away from the reinforcing female die member by the closing of the main dies.

4. In bending dies the combination of a main male die member and a main female die member and reinforcing male and female die members adapted when the main dies are in open position to fit into one another and adapted to open away from one another by the closing of the main dies and arms hinged to one of the main die members, to which the reinforcing die members are connected.

5. In bending dies the combination of main male and female die members and reinforcing male and female die members, the male reinforcing die member occupying a position intermediate the two female reinforcing die members and adapted to have its acting face moved away from the acting face of the female reinforcing die members by the closing of the main dies and arms hinged to one of the main die members, to which the reinforcing die members are connected.

6. In bending dies the combination of main male and female die members adapted to act upon the outer faces of a channel beam, a reinforcing male die member of a width in part to fill the space between the flanges of the channel beam and in part of a

less width, and a reinforcing female die member of a width in part to fill the space between the flanges and of less width in part; the narrower portions of the two reinforcing die members adapted to overlap and the reinforcing male die member being positioned to be moved away from the reinforcing female die member by the closing of the main dies and arms hinged to one of the main die members, to which the reinforcing die members are connected.

7. In bending dies the combination of the main male die member having a centrally projected portion, the main female die member having a centrally recessed portion, said members being adapted to act upon the outer faces of the flanges of the channel beam; a reinforcing male die member having a central portion of full width to lie between the flanges of a channel beam and having on its acting face, side extensions of a lesser width, and reinforcing female die members having an outer portion of full width and an inwardly projecting extension on its acting face of less width, the extended portions of the reinforcing die members fitting together in initial position and the reinforcing male die members occupying a position to be moved by the closing of the main dies to retreat away from the reinforcing female die members.

8. In bending dies the combination of the main male die member having a centrally projected portion, the main female die member having a centrally recessed portion, said members being adapted to act upon the outer faces of the flanges of the channel beam; a reinforcing male die member having a central portion of full width to lie between the flanges of a channel beam and having on its acting face, side extensions of a lesser width, and reinforcing female die members having an outer portion of full width and an inwardly projecting extension on its acting face of less width, the extended portions of the reinforcing die members fitting together in initial position and the reinforcing male die member occupying a position to be moved by the closing of the main dies to retreat away from the reinforcing female die members, and arms hinged to the main female die member, to which the reinforcing die members are connected.

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