No. 679,566. Patented July 30, 1901.

C. KLING.

METAL SHEARING MACHINE.

(No Model.) (Application filed Oct. 1, 1900.) 4 Sheets—Sheet 1.

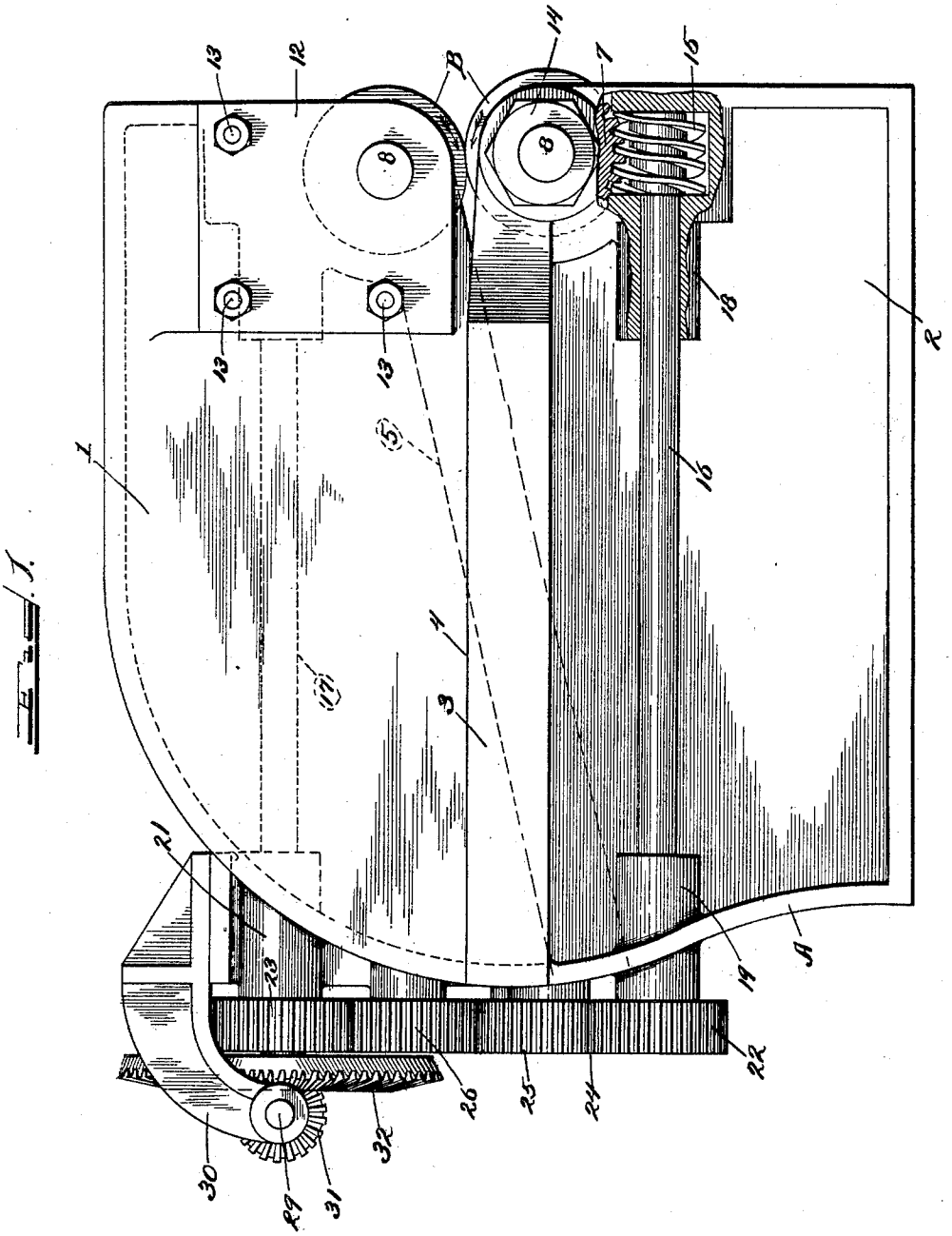


Fig. 1.

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METAL SHEARING MACHINE.

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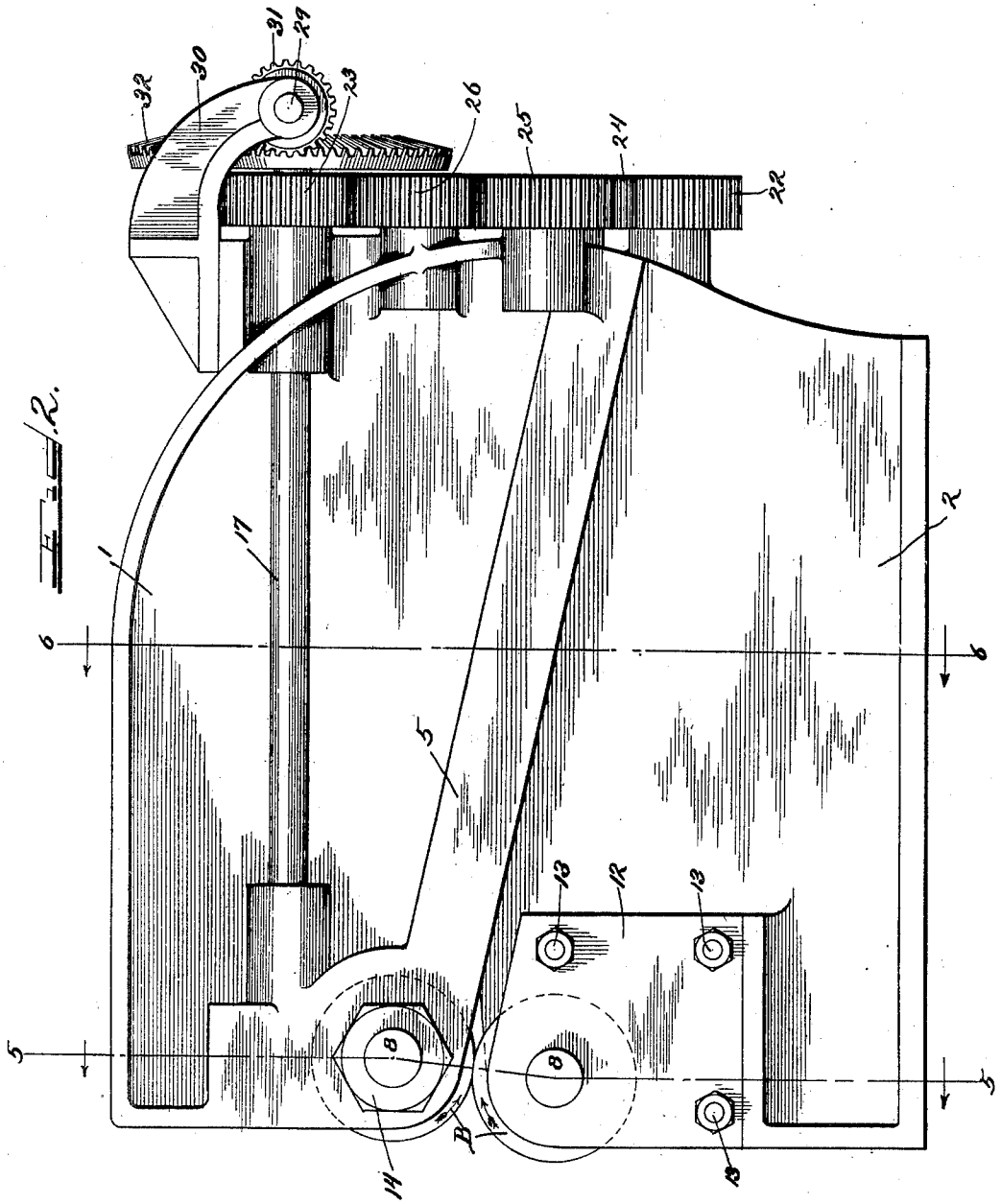


FIG. 2.

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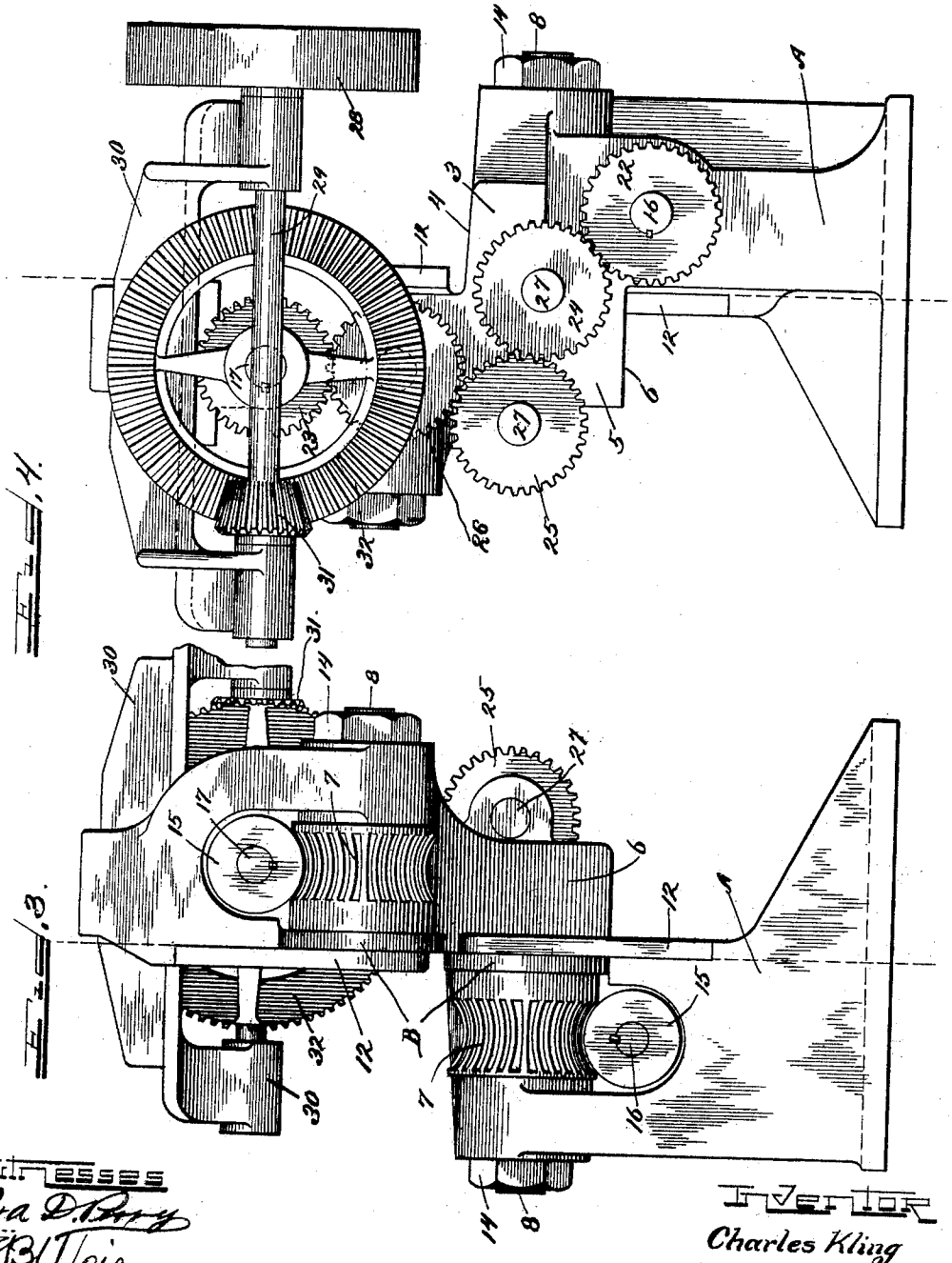
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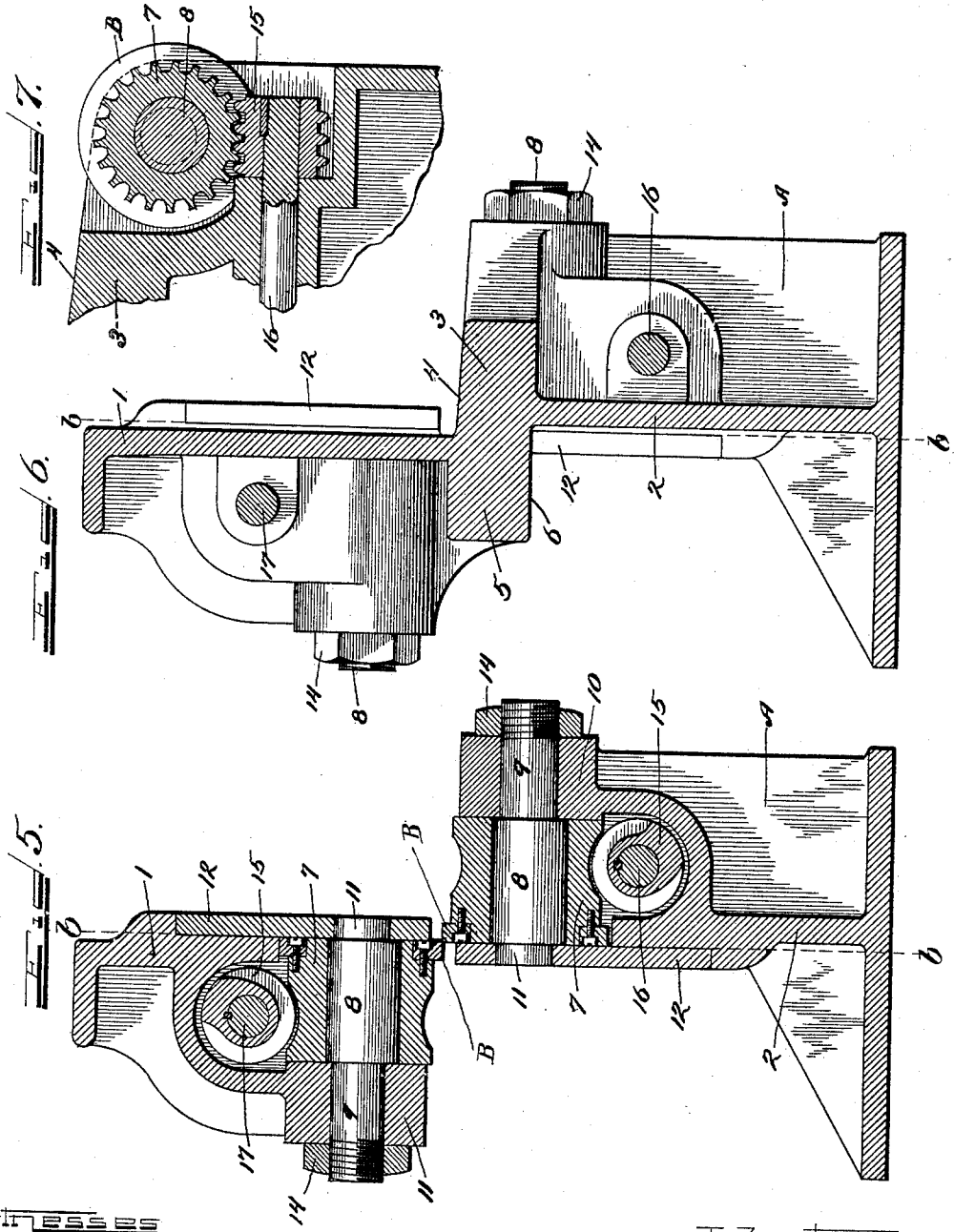
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METAL SHEARING MACHINE.

(No Model.)

(Application filed Oct. 1, 1900.)

4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

CHARLES KLING, OF CHICAGO, ILLINOIS.

METAL-SHEARING MACHINE.

SPECIFICATION forming part of Letters Patent No. 679,566, dated July 30, 1901.

Application filed October 1, 1900. Serial No. 31,616. (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, in the State of Illinois, (and whose post-office address is No. 287 Hawthorne avenue, Chicago, Illinois,) have invented certain new and useful Improvements in Metal-Shearing Machines, of which the following is a specification.

This invention relates to improvements in that class of metal-shearing machines in which rotary cutters are employed and which for this reason are usually designated in the trade as "rotary shears."

The object of the invention is to provide an improved construction in machines of this character which shall be capable of shearing plates or sheets of any width or length whatsoever by the continuous operation of its rotary cutters, and, further, to provide a generally improved and massive design capable of the severest service at a minimum cost in operating expenses and repairs.

The invention consists in the matters hereinafter set forth and particularly pointed out in the appended claims.

In the construction embodying the present improvements the plane of the meeting faces of the rotary cutters is arranged coincident or parallel with the general plane of the machine-frame, and the driving-shafts which actuate these rotary cutters extend along opposite sides of said frame in the same general direction as the paths of movement provided for the several edges of the sheared plate. Said shafts are geared together at the rear of the machine by a gearing which extends across its frame between them in such manner and location as to lie between said paths of movement, so that the advance of the sheet from the cutters is not thereby inteferred with, no matter what its length, and the main driving parts, through which the driving power is originally applied to the machine, actuate said driving-shafts through suitable operative connections with one end of the gearing which connects them. This will be more fully understood from the following description of the construction illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of one side of a rotary shearing-machine embodying the present improvements in one form. Fig. 2 is a similar view of the opposite side of the machine. Figs. 3 and 4 are respectively front and rear elevations thereof. Figs. 5 and 6 are transverse sections taken on lines 5 5 and 6 6, respectively, of Fig. 2. Fig. 7 is a sectional detail taken on line 7 7 of Fig. 3.

In the construction thus illustrated, A designates the main-frame casting of the machine, and B its rotary cutters, which are journaled at the front of the frame, with their meeting faces overlapping in a vertical plane *b b*, hereinafter referred to as the "cutting-plane." The main supporting-web of the frame A extends parallel to the cutting-plane *b b* and comprises upper and lower portions 1 and 2, respectively, which are cast integral with each other, but are offset slightly, so as to stand on opposite sides of said cutting-plane. The lower web-section 2 merges along its upper edge into a heavy integral rib 3, the upper surface 4 of which extends rearwardly substantially in line with the meeting edges of the cutters B. Correspondingly the upper web-section 1 merges along its lower edge into a similar heavy integral rib 5, the lower surface 6 of which extends rearwardly substantially in line with the meeting edges of the rotary cutters B. These ribs 3 and 5 are furthermore arranged somewhat angularly with reference to each other, so that they, in effect, cross each other, as shown in Fig. 2, and afford a connection of ample strength between the sections of the frame above and below the ribs. The upper and lower surfaces 4 and 6 of said ribs 3 and 5 constitute, in effect, paths of movement for the severed edges of the sheet as it is sheared apart by the cutters B, that edge of the sheet which lies above the lower cutter B being directed rearwardly along the surface 4 of one side of the machine-frame, while the other edge of the sheet, which lies beneath the upper cutter B, is directed thence rearwardly and downwardly beneath the surface 6 on the opposite side of the machine-frame.

In the approved construction shown the cutters B are each rigidly secured to and rotated by a worm-gear 7, that is revolubly journaled upon a supporting-shaft 8. The outer end 9 of the lower one of these shafts 8 has its bearing

in a lug 10, which is preferably cast integral with the base of the machine-frame A, and the outer end 9 of the upper shaft 8 is similarly mounted in a lug 11, preferably cast integral with the upper portion of said frame. At their inner ends 11 said shafts have their bearing in plates 12, which are herein shown as removable and as secured by bolts 13 or otherwise to the inner faces of the upper and lower web-sections 1 and 2 of the main frame. Vertical adjustment of the cutters is then provided for by making the journal portions of the shafts 8 somewhat eccentric to their end portions 9 and 11, so that by rotating said shafts in their bearings the worm-gears, and consequently the cutters, may be moved bodily up or down to the extent of the eccentricity provided, clamping-nuts 14 on the ends of the shafts enabling them to be locked in the desired position of adjustment.

Rotation of the worm-gear 7 to actuate the cutters is accomplished by worm-wheels 15, secured upon the forward ends of rearwardly-extending shafts 16 and 17. The lower shaft 16 is revolubly mounted in bearing-lugs 18 and 19 on one side of the base of the frame, while the upper shaft 17 is similarly mounted in lugs 20 and 21 on the opposite side of the upper portion of the machine-frame. The intermeshing teeth of the worm wheels and gears are made deep enough to permit the described adjustment of the cutters without interfering with their sufficient engagement, and it is designed that when adjusted for the heaviest cutting the teeth will be most completely and deeply intermeshed. The shafts 16 and 17 are connected to rotate together by a gearing comprising spur-gears 22 and 23, secured upon the ends of said shafts, and intermediate intermeshing gears 24, 25, and 26, loosely mounted on studs 27 on the rear end of the machine-frame. This connecting-gearing is characterized by the fact that on that side of the cutting-plane on which the lower cutter is located the gearing does not anywhere rise to or above the plane of the surface 4 over which one severed edge of the plate must travel, while on the other side of the cutting-plane, or that on which the upper cutter is located, said gearing does not at any point extend to or below the plane of the surface 6, beneath which the other severed edge of the sheared plate travels. Any suitable arrangement of gearing which is thus characterized and which will at the same time cause the two cutters to rotate in the proper directions would satisfactorily fill the requirements of the situation; but the particular arrangement shown and in which it will be noted that one or both of the intermediate gears is of less diameter than the distance between the planes of the surfaces 4 and 6 at the rear end of the machine is believed to be of superior simplicity and to offer less frictional resistance, and is therefore more advantageous than any yet devised for the purpose.

Rotation of the intergeared worm driving-shafts may be accomplished by any suitable driving mechanism applied at either end of the train. In the approved construction shown this consists of a driving-pulley 28, secured to the end of a transverse shaft 20, mounted in a yoke 30 at the upper rear end of the main frame. A beveled pinion 31 is also secured on this transverse shaft and intermeshes with a beveled gear 32, fixed on the end of the shaft 17 beyond the spur-gear 23, thus causing said shaft 17 and gear 23 to revolve and to thereby rotate the shaft 16 through the intermediate gears 24, 25, and 26. It will, however, be understood that such gearing may be readily altered to bring the shaft 29 into parallel with the machine-bed instead of transversely thereto, if so desired. It will also be understood that the driving mechanism described might be located at the base of the machine to operate upon the gear 22 of the lower shaft instead of upon the gear 23 of the upper shaft, if so desired, that various other changes in the arrangement of the entire gearing for driving the work-shafts in unison may be made so long as the limitations above referred to are observed, and that changes may be made in the various other details of the construction shown without departure from the broad spirit of the invention claimed.

I claim as my invention—

1. A rotary shears provided with a pair of coacting rotary cutters, actuating-shafts geared to said cutters and arranged in planes parallel to the cutting-plane of said rotary cutters on opposite sides of the cutter-supporting frame, and means for rotating said shafts.

2. A rotary shears comprising a frame, a pair of coacting rotary cutters secured to gears mounted in said frame and arranged with their cutting-plane extending longitudinally of the frame, driving-shafts extending longitudinally of said frame on opposite sides of the cutting-plane and transversely to the axes of the rotary cutter, gears on said shafts intermeshing with the gears of the cutters, and means for rotating the shafts.

3. A rotary shears comprising a frame, a pair of rotary cutters mounted in said frame, divergent paths extending from the cutters rearwardly along opposite sides of the frame in the direction of the cutting-plane, cutter-actuating shafts also extending along opposite sides of said frame to the rear end thereof, gearing connecting said shafts at the rear of the frame and which at no point on the upper cutter's side of the cutting-plane projects above the path leading from said upper cutter and at no point on the lower cutter's side of the cutting-plane projects below the path leading from said lower cutter, and means for rotating said intergeared shafts.

4. A rotary shears comprising a frame, a pair of coacting rotary cutters mounted in said frame, uninterrupted divergent paths for the severed edges of the sheared metal leading rearwardly from said cutters along

opposite sides of said frame, a pair of shafts each geared to one of said cutters leading rearwardly along opposite sides of the frame, spur-gears on the rear end of each of said shafts, and intermediate gears connecting said spur-gears between the paths of travel of the severed edges of the metal, substantially as described.

5. A rotary shears comprising a frame, a pair of coacting rotary cutters mounted in said frame, a pair of actuating-shafts each geared to one of said cutters and both extending parallel to the cutting-plane of the cutters on opposite sides of the frame and lengthwise thereof, gearing connecting the rear ends of said shafts, and gearing for rotating said intergeared shafts comprising a gear on one of said shafts, a pinion on an adjacent counter-shaft intermeshing with said gear, and a driving-wheel on said counter-shaft.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 27th day of September, A. D. 1900.

CHARLES KLING.

Witnesses:
HENRY W. CARTER,
S. A. JONES.