No. 821,667. PATENTED MAY 29, 1906.

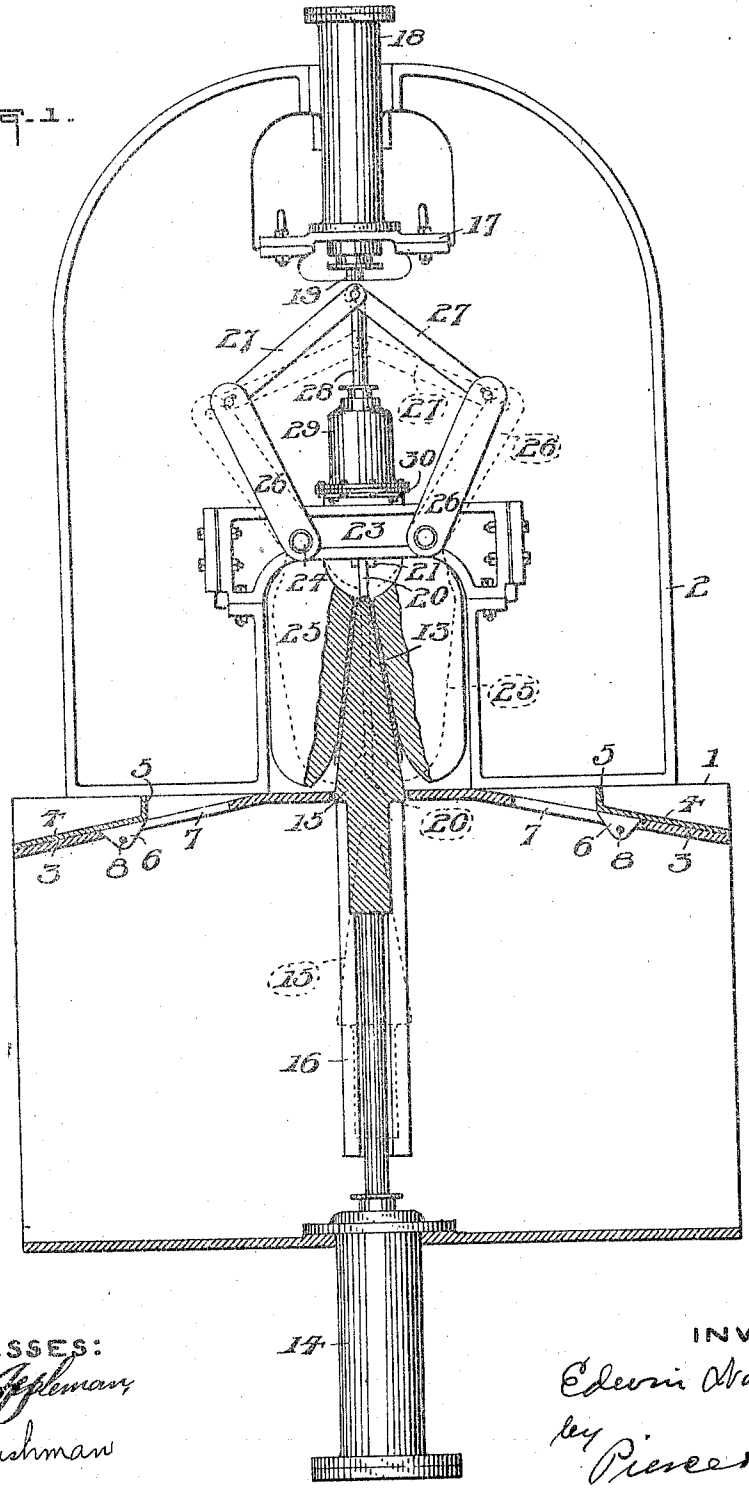
E. NORTON.

DOUBLER FOR SHEET METAL.

APPLICATION FILED APR. 8, 1905.

4 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

J. P. Appleman

M. A. Bushman

INVENTOR

Edwin Norton

by Pierce & Barber

his ATTORNEYS

No. 821,667. PATENTED MAY 29, 1906.

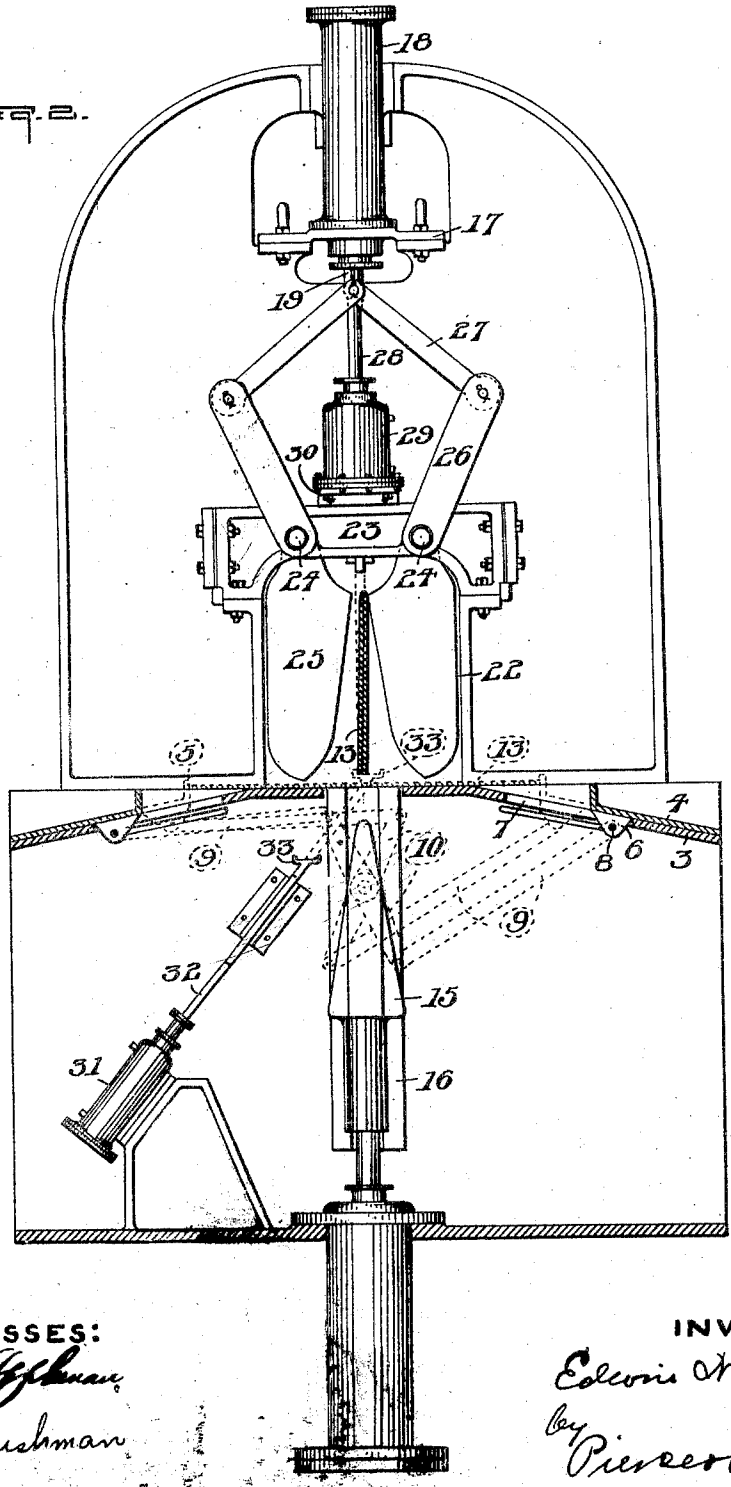
E. NORTON.

DOUBLER FOR SHEET METAL.

APPLICATION FILED APR. 8, 1905.

4 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

J. P. Hoffman

M. A. Bushman

INVENTOR

Edwin Norton

by Pierce & Barber

his ATTORNEYS

No. 821,667. PATENTED MAY 29, 1906.

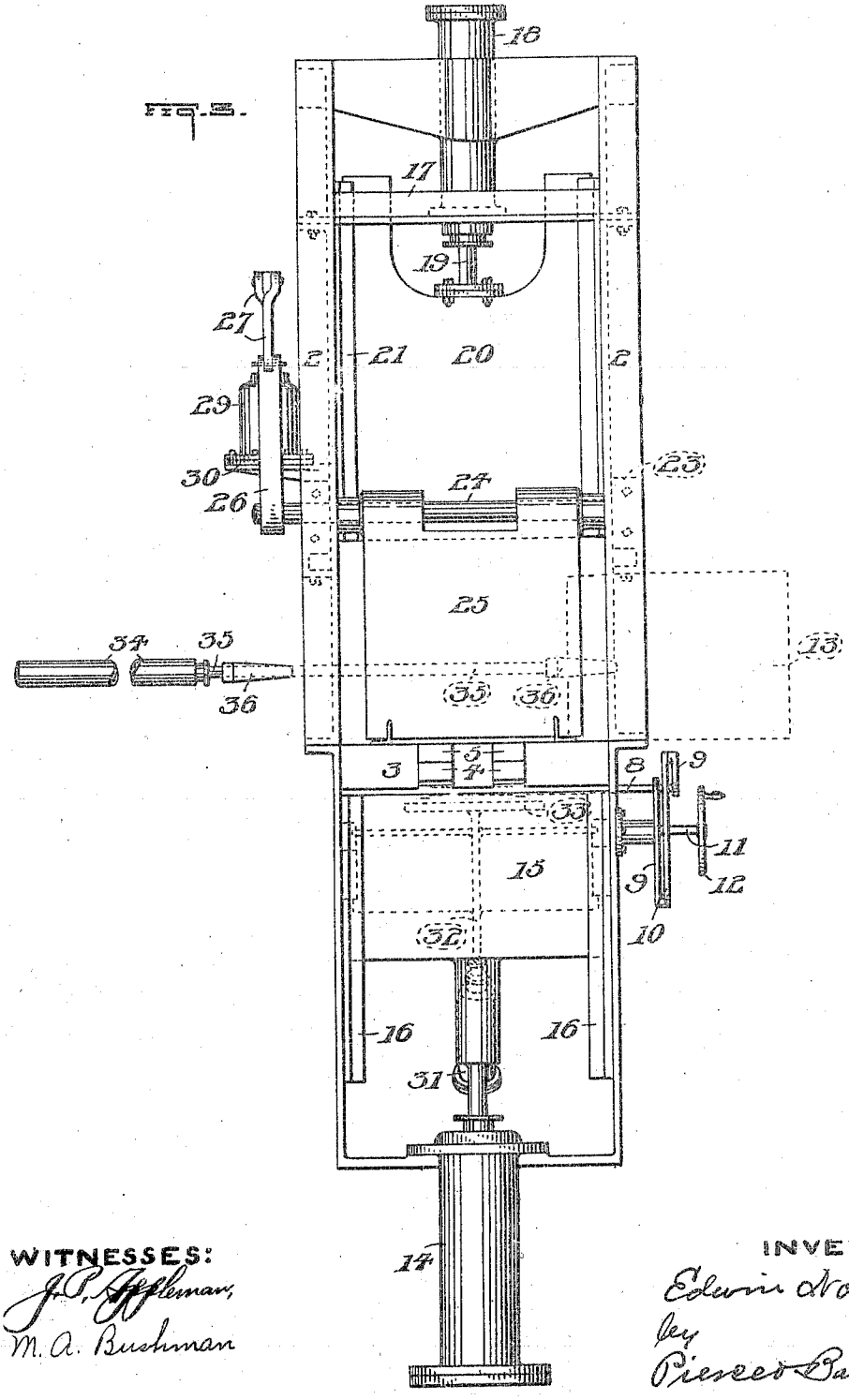
E. NORTON.

DOUBLER FOR SHEET METAL.

APPLICATION FILED APR. 8, 1905.

4 SHEETS—SHEET 3.

Fig. 5.



WITNESSES:

J. P. Appleman,

M. A. Bushman

INVENTOR

Edwin Norton,

by Pierce & Barber

his ATTORNEYS

No. 821,667. PATENTED MAY 29, 1906.

E. NORTON.

DOUBLER FOR SHEET METAL.

APPLICATION FILED APR. 8, 1905.

4 SHEETS—SHEET 4.

Fig. 4.

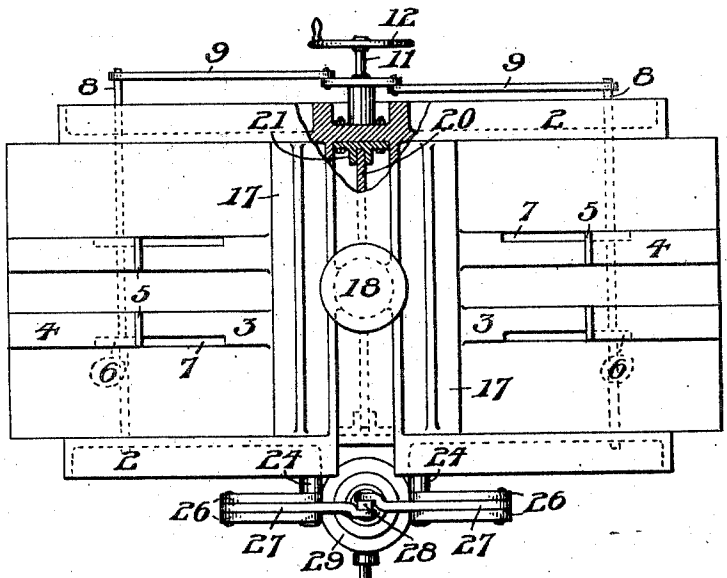


Fig. 5.

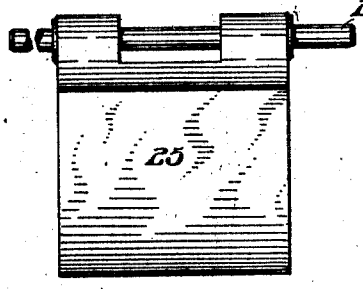


Fig. 6.



Fig. 7.

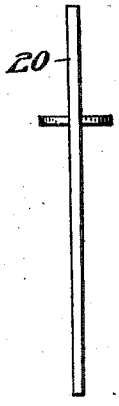


Fig. 8.

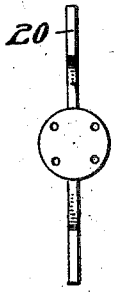


Fig. 11.



Fig. 9.

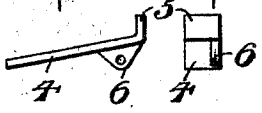


Fig. 10.

WITNESSES:

J. P. Jeffman.

M. A. Bushman.

INVENTOR,

Edwin Norton

by Pierce & Barker

his ATTORNEYS.

UNITED STATES PATENT OFFICE.

EDWIN NORTON, OF NEW YORK, N. Y.

DOUBLER FOR SHEET METAL.

No. 821,667. Specification of Letters Patent. Patented May 29, 1906.

Application filed April 8, 1905. Serial No. 254,617.

To all whom it may concern:

Be it known that I, EDWIN NORTON, a citizen of the United States, residing in the city of New York, in the county of New York and State of New York, have invented new and useful Improvements in Doublers for Sheet Metal, of which the following is a specification.

My invention relates to doublers for sheet metal; and its object is to provide means for gaging the sheets, so that they shall have their centers directly in line with the doubling plunger or blade, for securely clamping the sheets when in said position, so that their centers will not slip on said plunger, for doubling the sheets with a minimum of power and of strain on them, for pressing the halves of the sheets into close contact with each other, for mechanically ejecting the double sheets, and for otherwise improving doubling-machines, as pointed out hereinafter.

Referring to the drawings which accompany this specification and form a part hereof, Figure 1 is a side elevation of one of the many forms which my invention may assume, parts being shown in vertical section, the doubling operation being partly completed; Fig. 2, a similar view showing the doubling operation completed and the doubled sheet ready to be ejected; Fig. 3, an end elevation showing in dotted lines the doubled sheet being ejected; Fig. 4, a top plan view, partly broken away; Fig. 5, a side view of the bending-plunger; Fig. 6, an end view of the same; Fig. 7, an end view of the clamping plunger or blade; Fig. 8, a top view of the same; Fig. 9, a side view of one of the gages; Fig. 10, a vertical section of one of the guides therefor, and Fig. 11 a side view of the ejector.

In the drawings, 1 represents the base or floor on which supports the larger part of the mechanism, and 2 2 are standards or side plates resting thereon. The sheets to be bent are fed on top of the floor or base 1 and between the standards 2.

At opposite sides of the vertical plane connecting the vertical center lines of the standards 2 are two pairs of tracks 3, inclined upwardly toward the said plane, but lying below the floor. Slidable on the upper surfaces of these tracks are the four gages 4, each having an upwardly-turned gage finger or lug 5 and a downwardly-projecting ear 6, slidable in the groove 7 of the track on which it slides. The gages on the same side of said plane constitute a pair and are connected together by the rod 8, which extends through eyes in the ears 6. To each rod 8 is connected one end of a link 9, the opposite ends of the links being connected at opposite ends of the lever 10, mounted at its center on the rock-shaft 11, which extends through one of the standards 2 and is provided with handle or hand-wheel 12. When the gages are farthest from the said plane, the upper ends of the gage-fingers are just below the floor 1, as shown in full lines on Fig. 2, so that a sheet may be shoved on the floor to a position between the retracted fingers. After the sheet has been so shoved the rotation of the shaft 11 in the proper direction causes the gages to ascend their tracks 3, the fingers at once coming above the floor in position to engage the edges of the sheet. As the fingers are equally distant from said plane and as the mechanism which operates opposite pairs of gages are alike, it is clear that when the fingers 5 engage opposite edges of a sheet the latter will leave its center exactly in the said plane. A plate 13 is shown on Fig. 2 clamped by the gages, which are also shown in dotted lines. Directly below the said plane is a hydraulic cylinder 14, whose piston supports the plunger 15, which travels in the guides 16. The plunger has a rounded upper edge rounded, as shown, and downwardly-divergent sides and stands when inactive with its said edge below the floor 1, as shown in dotted lines in Fig. 1. Its longitudinal center lies in the said plane.

On the plate or platform 17, connecting the upper portions of the standards or housings 2, is the hydraulic cylinder 18, whose piston-rod 19 is secured to the top of the clamping-plate 20, consisting of a vertical plate movable in the plane above mentioned and having its ends traveling in the guides 21 in the said housings. The housings 2 are provided at the bottom with openings 22, in which are secured bearing-blocks 23 for the rock-shafts 24, to which are secured the pendent bending dies and jaws 25. When inactive, the outer sides of the jaws are vertically supported against the side of the openings 22. The said jaws extend entirely across from one housing to the other, the shafts lying parallel to and at equal distances from the said plane and the opposing faces of the jaws forming a wedge-shaped opening corresponding to the shape of the bending-plunger

15. The lower ends of these faces are rounded to form a guide for the sheets as they are pressed up between the jaws and to reduce the friction and strain on the sheets. The rock-shafts 24 are provided with the arms 26, which diverge upwardly, their upper ends being connected by the links 27 to the piston-rod 28, which works in the hydraulic cylinder 29, supported on the bracket 30 at the side of one of the housings.

31 is an inclined hydraulic cylinder having its piston-rod 32 extending toward the said plane, which it may intersect at the floor-line 1. The upper end of the piston-rod 32 has the shoe or rest 33 to support the doubled sheets after the jaws 25 have released them. The shoe normally rests as shown in full lines in Fig. 2 and supports the sheets as shown in dotted lines thereon.

34 represents a horizontal hydraulic cylinder having its piston-rod 35 provided with the fork 36, which engages the edge of the doubled sheet as it stands on the shoe 33 and pushes it endwise from between the jaws 25.

The operation is as follows: The gage-fingers 5 and the bending die or plunger 15 lie below the level of the floor, as shown in full lines on Fig. 1, and the shoe 33 is at its lowest position, as shown in full lines on Fig. 2. The jaws 25 are open, as shown in full lines on Figs. 1 and 2, and the clamping-plunger has its bottom edge spaced above the floor enough to allow a sheet to be shoved beneath it, as shown in dotted lines on Fig. 1. The fork 36 is retracted from between the jaws 25, as shown in full lines on Fig. 3. A sheet 13 (shown in dotted lines on Fig. 2) is fed on the floor 1, so as to be between the fingers 5 of opposite pairs of gages. The wheel 12 is operated to clamp and center the sheet, as before described. The plunger 15 and the clamp 20 are now operated so as to clamp the sheet therebetween. The plunger continues to advance, while the clamp 20 retreats at an equal pace to keep the sheet firmly clamped. The sheet is pushed by the plunger, which is the male die, between the jaws 25, which constitute the female die, and takes the angular shape shown in full lines in Fig. 1. When the bend in the sheet reaches the upper ends of the jaws 25, the plunger 15 commences to descend and the cylinder 29 is supplied with fluid to cause the jaws 25 to move toward each other. The jaws at once clamp and pinch tightly the bent or doubled edge of the sheet, and the clamping or shaping action of the jaws 25 closes the halves of the sheet together as the plunger 15 retires. After the plunger has sunk out of the way the shoe 33 is advanced to support the doubled sheet just prior to its release from the jaws 25. The fork 36 is then advanced to shove the sheet endwise from between the jaws, as shown in dotted lines in Fig. 3. In the meantime the gages are retired, and after the action of the fork 36 the shoe is lowered, when all the parts are ready for another cycle of said operations.

Having described my invention, I claim—

1. In a doubling-mill for sheet metal, a feeding-floor, gages normally retracted so as to be beneath said floor to permit the sheets to be fed thereover and between which gages the sheets are fed, means for causing the gages to project above the floor and travel toward each other at equal speeds.

2. In a doubling-mill for sheet metal, laterally-movable female dies, a male die, coöperative therewith, and a clamping member operating in conjunction with the male member to clamp the sheets therebetween at the commencement of the bending operation.

3. In a doubling-mill for sheet metal, laterally-moving female dies, a male die coöperative therewith, and a non-bending clamping member movable to engage the sheets on the side opposite the male die, and means for causing the latter and the said member to move together during the bending operation.

4. In a doubling-mill for sheet metal, a female die composed of movable sections, a male die arranged to enter between said sections, means for moving the sections of the female die toward each other as the male die retires and means located between the sides of the female die and acting in conjunction with the male die to clamp the sheets.

5. In a doubling-mill for sheet metal, a female die composed of movable sections, a male die arranged to enter between said sections, means for moving the sections toward each other as the male die retires so as to clamp the doubled sheets between said sections, and means independent of the dies for supporting the doubled sheet after the male die retires.

6. In a doubling-mill for sheet metal, a female die composed of movable sections, a male die arranged to enter between said sections, means for moving the sections toward each other as the male die retires so as to clamp the doubled sheets between said sections, means for supporting the doubled sheet after the male die retires and means for ejecting the sheet after being released from the said sections.

7. In a doubling-mill for sheet metal, laterally-movable female dies, a pair of plungers to engage opposite surfaces of a sheet, means to move the plungers in the same direction after said engagement, one plunger constituting a male die coöperative with the female die, the remaining plunger passing beyond the working faces of the female dies at the close of the bending operation.

8. In a doubling-mill for metal sheets, dies for bending the sheets double, and means for ejecting the doubled sheets from the dies in substantially a prolongation of the planes which they include in the dies.

9. In a doubling-mill for sheet metal, vertical dies for bending the sheets and a support for the sheets movable beneath the same after the bending operation and into the path of one of the dies after the latter has retired from said path.

10. In a doubling-mill for sheet metal, female dies, a male die coöperative therewith, means for retracting the male die after the bending operation, a support for the doubled sheet, and means for moving the same below the doubled sheet after the retraction of the male die.

Signed at New York city this 1st day of February, 1905.

EDWIN NORTON.

Witnesses:
J. GALLWITZ,
WM. L. PIERCE.