No. 836,625. PATENTED NOV. 20, 1906.

L. A. BIGGAR.

SHEET METAL BENDING MACHINE

APPLICATION FILED JULY 19, 1904.

4 SHEETS—SHEET 1.

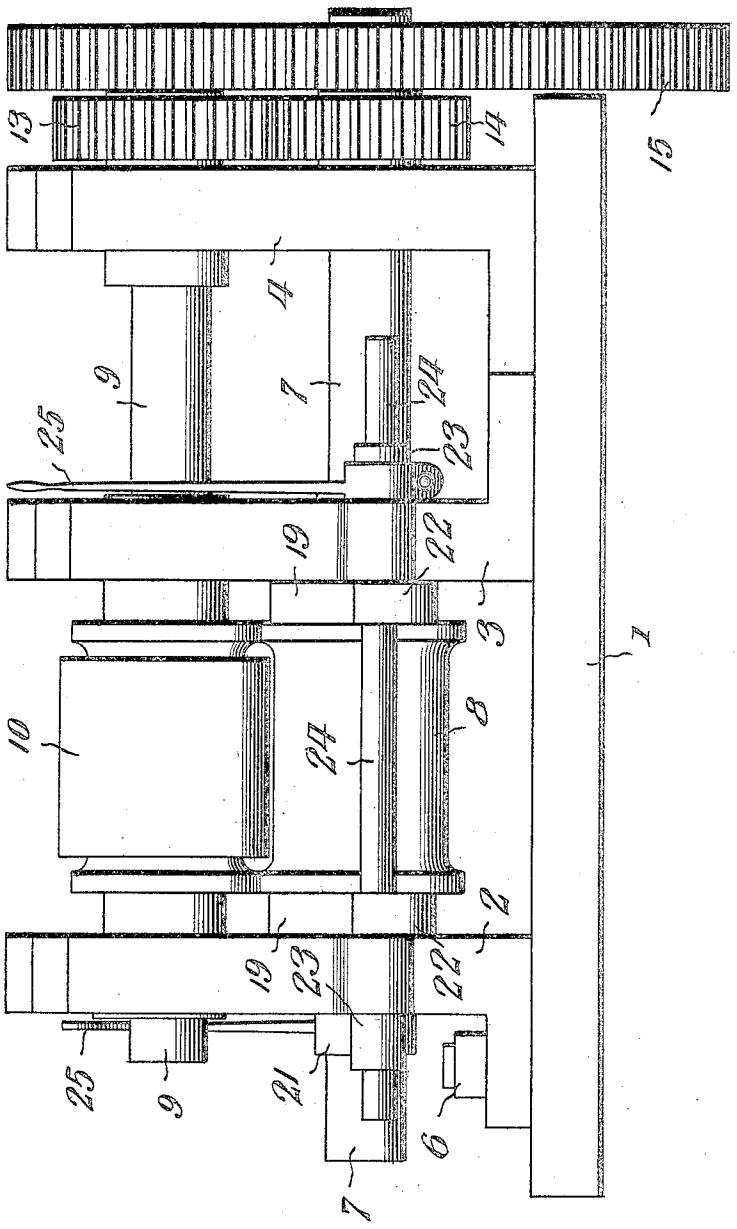


Fig. 1.

Witnesses

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4 SHEETS—SHEET 2.

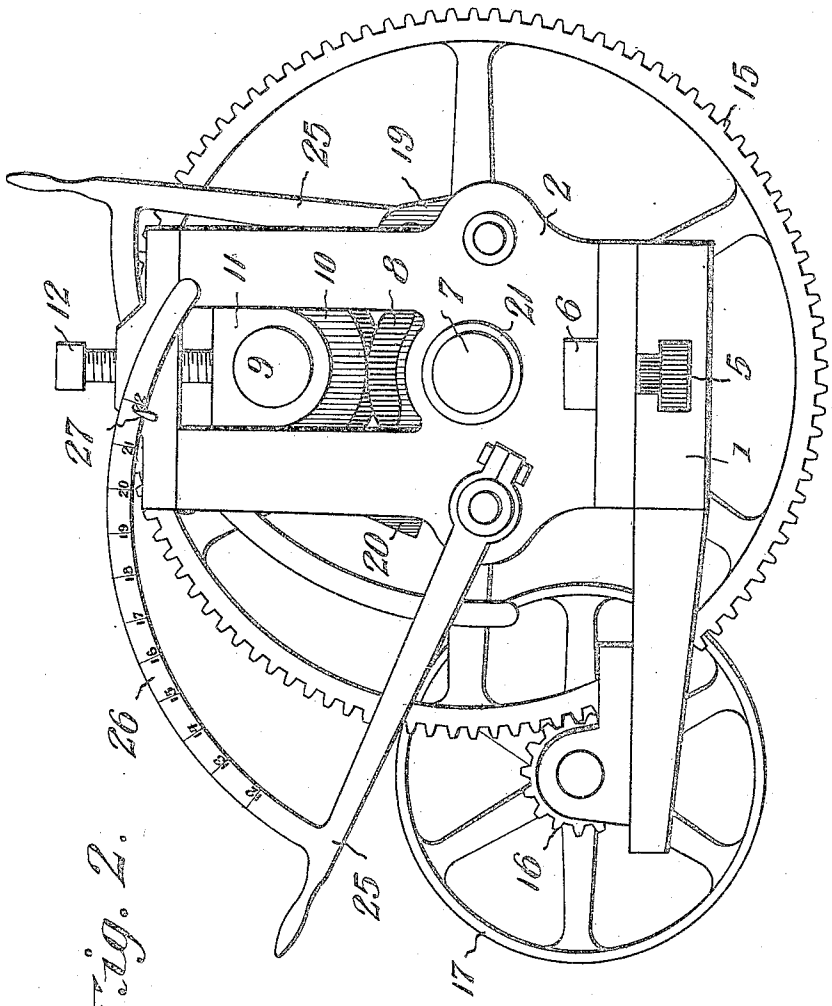


Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 4.

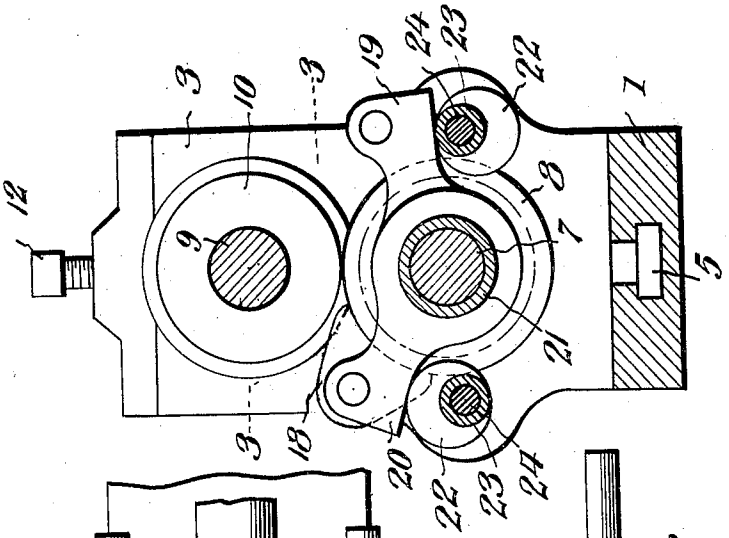


Fig. 3.

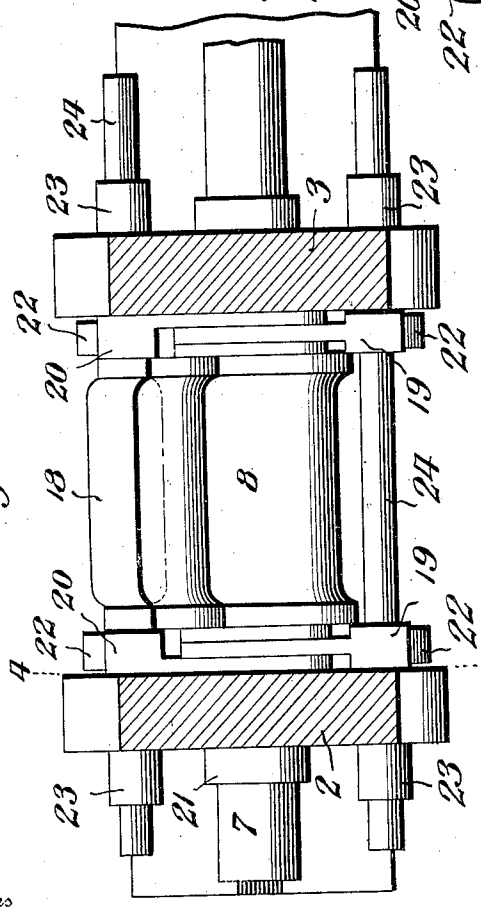


Fig. 5

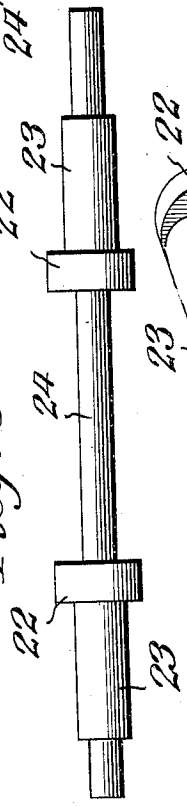
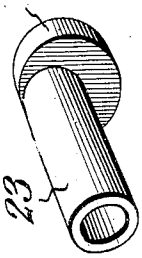


Fig. 6.



Witnesses

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4 SHEETS—SHEET 4.

Fig. 8.

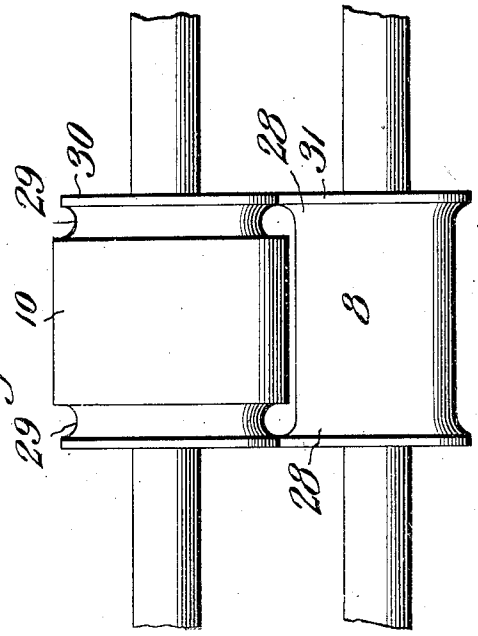


Fig. 13.



Fig. 11.

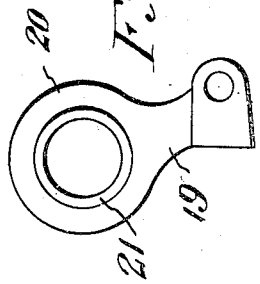


Fig. 9.

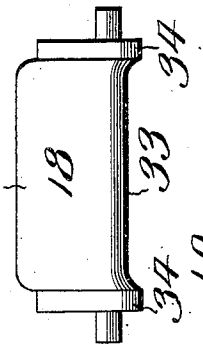


Fig. 10.

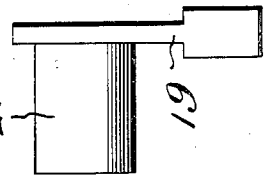


Fig. 7.

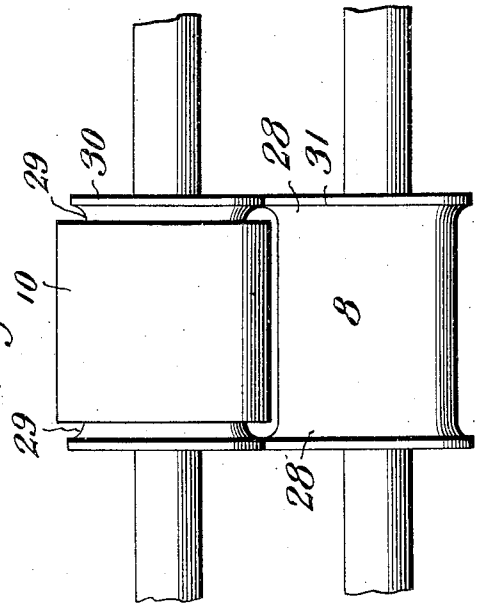


Fig. 12.



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UNITED STATES PATENT OFFICE.

LEROY A. BIGGAR, OF ONEIDA, NEW YORK.

SHEET-METAL-BENDING MACHINE.

No. 836,625. Specification of Letters Patent. Patented Nov. 20, 1906.

Application filed July 19, 1904. Serial No. 217,204.

To all whom it may concern:

Be it known that I, LEROY A. BIGGAR, a citizen of the United States, residing at Oneida, in the county of Madison and State of New York, have invented new and useful Improvements in Sheet-Metal-Bending Machines, of which the following is a specification.

This invention relates to sheet-metal-bending machines.

The objects of the invention are to improve and simplify the construction of such machines.

With these objects in view the invention resides primarily in a sheet-metal-bending machine having rolls shaped in such manner that the opposite edges of a sheet-metal strip may be curled toward each other.

The invention likewise resides in shoes resting against the periphery of one roll and combined with means for adjusting them toward and from the periphery of the other roll to effect the bending of the sheet-metal strip in a longitudinal direction.

Furthermore, the invention resides in the particular combination and arrangement of parts and in the precise details of construction hereinafter described and claimed as a practical embodiment of the invention.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of a machine constructed in accordance with the invention. Fig. 2 is an end elevation thereof. Fig. 3 is a horizontal section on the line 3 3 of Fig. 4. Fig. 4 is a section on the line 4 4 of Fig. 3. Fig. 5 is a plan view of the cam-shaft. Fig. 6 is a perspective view of one of the cams. Fig. 7 is a view in elevation, showing one form of coöperating rolls. Fig. 8 is a similar view showing another form of coöperating rolls. Fig. 9 is a detail elevation of one of the bending-shoes. Fig. 10 is a side elevation of one of the shoe-supports. Fig. 11 is an end elevation of the same. Fig. 12 is a cross-section of a sheet-metal strip as formed by the rolls shown in Fig. 7. Fig. 13 is a similar view of a strip as formed by the rolls shown in Fig. 8.

Similar numerals of reference indicate corresponding parts in the different figures of the drawings.

The numeral 1 indicates a base upon which are mounted uprights or standards 2, 3, and 4. The standard 2 is adjustable toward and away from the standard 3 in any suitable manner, as by means of the undercut groove 5 in the base 1 and the adjusting-nut bolt 6 on the standard 2, this arrangement permitting various lengths of rolls to be employed interchangeably in operating upon sheet-metal strips of different widths, as will appear more clearly hereinafter.

Extending through the standards 2, 3, and 4 is a shaft 7, which carries a lower shaping-roll 8. A similar shaft 9 carries the upper shaping-roll 10. The shaft 9 is mounted in a journal-box 11 in each standard and is adjustable toward and from the roll 8 by means of screws, such as 12. Rotation is imparted to the shafts 7 and 9 in any suitable manner, as by a gear-wheel 13, which is enmeshed with a similar gear-wheel 14 on the lower shaft 7, a large gear-wheel 15 being provided upon the end of the shaft 7 and enmeshed with the teeth 16 on a belt-wheel 17, operated from any suitable source of power.

A pair of bending-shoes, such as 18, (shown in Figs. 4 and 9,) rest against the periphery of the lower roll 8, one face of each shoe being formed on the segment of a circle for this purpose. The shoes are supported on opposite sides of the roller by means of supports 19 and 20. As shown in Figs. 4, 10, and 11, the support 19 for one of the shoes is formed with a tubular extension 21, which surrounds the shaft 7 and extends through the adjacent standard, as shown in Figs. 1 and 2, thereby forming a bushing for the shaft and also permitting the shoe to be radially moved upon the periphery of the roll. The support 20 for the opposite shoe is formed with a large eye, which surrounds the tubular extension 21 of the support 19. By forming the shoe-supports in the manner described the shoes may be adjusted radially upon the periphery of the lower roll in order to dispose them nearer to or farther from the periphery of the upper roll for the purpose of regulating the extent to which the sheet-metal strip shall be bent in a longitudinal direction. The adjustment of the shoes 18 toward and from the periphery of the upper roll is regulated by means of eccentric cams 22, (shown in Figs. 5 and 6,) formed with tubular extensions 23, which surround shafts 24 24, it being understood that the arrangement of the shafts and cams is duplicated on opposite sides of the machine. The tubular extensions 23 of the cams 22 are splined upon the shafts 24, so as to be moved longitudinally

thereon when the standard 2 is adjusted away from or toward the standard 3 to receive a different set of rolls for operating upon a different width of sheet-metal strip. The tubular extensions 23 of the cams 22 also form bushings for the shafts 24. Each of the shafts 24 is operated by means of a lever 25, attached thereto and provided with a gage 26, which, in conjunction with a pointer 27 upon the adjacent standard, serves to indicate the degree of movement of the cams, and consequently the bend of the sheet-metal strip. It will be observed that by moving the levers 25 in one direction the shoes 18 will be moved around the lower roll until they lie close to the periphery of the upper roll.

As shown clearly in Figs. 7 and 8, the lower roll 8 is annularly flared or enlarged at its ends, as shown by 28, and the upper roll 10 is formed with annular grooves 29, the grooves in Fig. 7 being flattened on their inner sides and the grooves in Fig. 8 being substantially semicircular, as shown. The rolls 8 and 10 are also formed at their ends with annular flange portions 30 and 31. It will be observed that as the rolls rotate the flared ends of the lower roll and the grooves of the upper roll register together to form annular channels, within which the sheet-metal strip is curled at the edges, as shown in either Fig. 7 or Fig. 8, according to which pair of rolls is used.

As shown in Fig. 9, the edge 32 of each shoe is shaped to fit closely against the periphery of the lower roll, and the edge 33 is shaped in such manner that it can be adjusted close to the periphery of the upper roll. Each shoe 18 is also formed with flanges 34, similar to the flanges 30 and 31 on the rolls.

In operating the machine the sheet-metal strip feeds down between the shoe 18 and the upper roll. For this reason the two shoes 18 serve to bend the strip in a longitudinal direction, imparting to it a circular curve, which can be made longer or shorter by adjusting the shoes away from or toward the periphery of the upper roll. By mounting the shoes in the manner described the sheet-metal strip is bent evenly throughout its entire length, and the bend is continued practically to the end of the strip by reason of the fact that the shoes can be swung around the lower roll until they lie close into the meeting portions of the two rolls adjacent to the periphery of the upper roll. It will be observed from the foregoing description that the extent to which the sheet-metal strip shall be bent in a longitudinal direction can be regulated easily by means of the levers 25 with their gages 26. Furthermore, it will be understood that one form or length of coöperating rolls may be removed from the machine and other forms or lengths substituted therefor in any suitable manner.

Changes in the precise embodiment of invention illustrated and described may be made within the scope of the following claims without departing from the spirit of the invention or sacrificing any of its advantages.

Having thus fully described the invention, what is claimed as new is—

1. A sheet-metal-bending machine having standards, coöperating rolls, a shaft for one of the rolls, shoes fitting against the periphery of one of the rolls, supports for the shoes each formed with a tubular extension fitting around the shaft and forming a bushing therefor in the adjacent standard, and means for adjusting said shoes toward and from the other roll.

2. A sheet-metal-bending machine having standards, coöperating rolls, a shaft for one of the rolls, a pair of shoes fitting against the periphery of one of the rolls, supports for one of the shoes, each formed with a tubular extension fitting around the shaft and forming a bushing therefor in the adjacent standard, supports for the other shoe, each having an eye fitting around the tubular extension of the opposite support, and means for adjusting the shoes toward and from the other roll.

3. A sheet-metal-bending machine having standards, coöperating rolls, shoes resting against the periphery of one of the rolls, a shaft, a cam for adjusting the shoes toward and from the other roll, a tubular extension on the cam surrounding the shaft and forming a bushing therefor in the standard, and means for rotating the shaft.

4. A sheet-metal-bending machine having standards adjustable with respect to each other, coöperating rolls mounted in the standards, shoes resting against the periphery of one of the rolls the face of each shoe adjacent the roll being curved concentric to the curvature of the roll, and means for adjusting said shoes toward and from the periphery of the other roll.

5. A sheet-metal-bending machine having coöperating rolls, shoes each having a segmental portion formed concentric with one of the rolls and resting against the periphery thereof, a lever for adjusting said shoes toward and from the other roll, and a gage for regulating the adjustment of the lever.

6. A sheet-metal-bending machine having coöperating rolls, shoes each having a segmental portion formed concentric with one of the rolls and resting against the periphery thereof, a support for each shoe movably mounted upon one of the roll-shafts, and a cam to move said support for adjusting said shoe toward and from the periphery of the other roll.

7. A sheet-metal-bending machine having coöperating rolls, shoes each having a segmental portion formed concentric with one of the rolls and resting against the periphery thereof, a cam for adjusting said shoes to-

ward and from the periphery of the other roll, a lever for operating the cam, and a gage for regulating the adjustment of the lever.

8. A sheet-metal-bending machine having coöperating rolls, means for adjusting said rolls toward and away from each other, shoes resting against the periphery of one of the rolls and each having a segmental portion formed concentric therewith, and means for adjusting said shoes concentrically of one of the rolls and radially of the other roll.

9. A sheet-metal-bending machine having coöperating rolls, one of the rolls being annularly enlarged or flared at its ends and formed with annular flange portions and the other roll being formed with annular grooves and annular flange portions, shoes each having a portion shaped on the segment of a circle and resting against the periphery of the enlarged roll and each shoe also having flanges, means for adjusting the shoes toward and from the periphery of the grooved roller, and gearing for operating the rolls.

In testimony whereof I affix my signature in presence of witnesses.

LEROY A. BIGGAR.

Witnesses:
JAMES W. ALBERT,
HAYES BIGGAR,
CHARLES R. COUTTS.