No. 754,786. PATENTED MAR. 15, 1904.

E. F. LOCKWOOD.

SHEET METAL EDGING MACHINE.

APPLICATION FILED JUNE 15, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

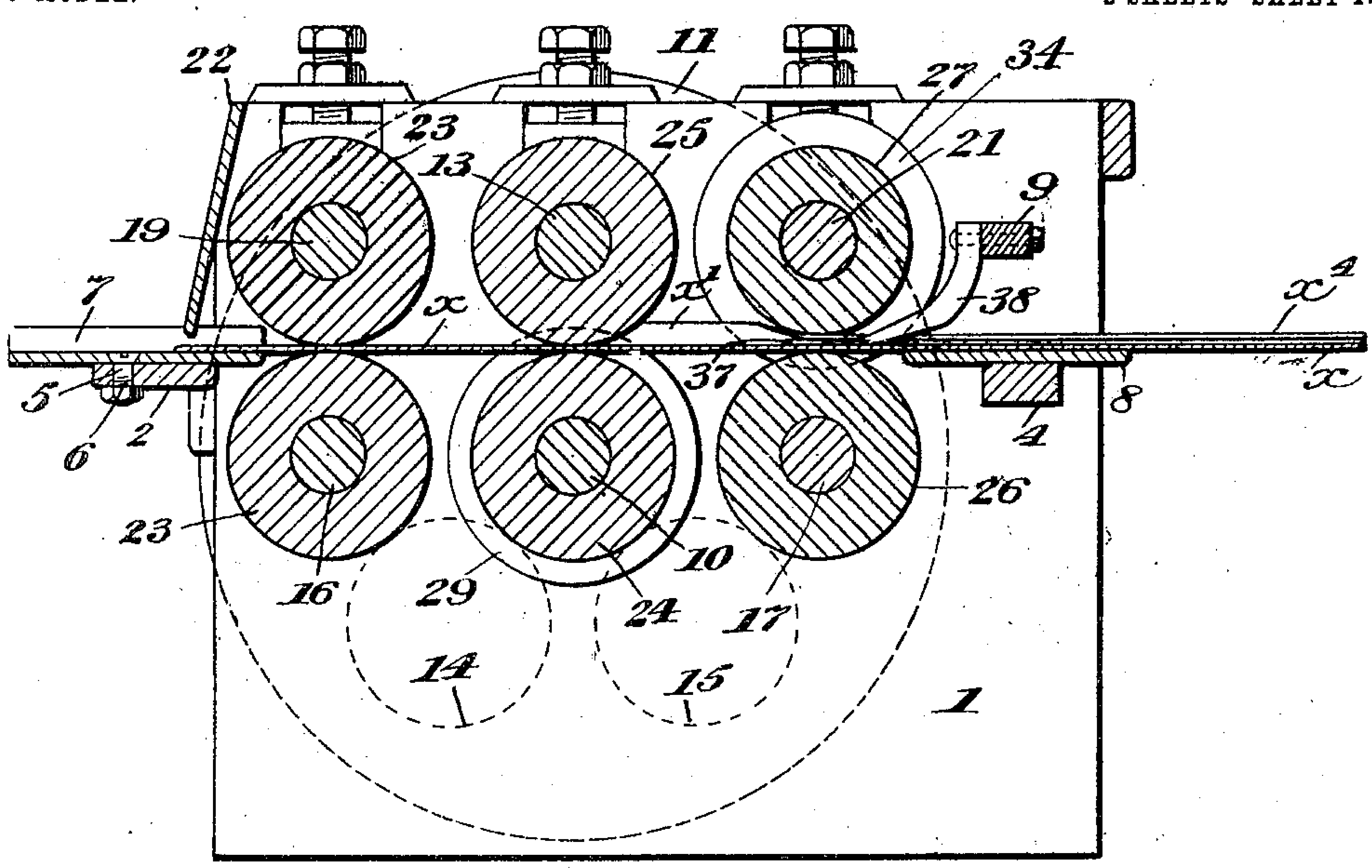

Fig: 1

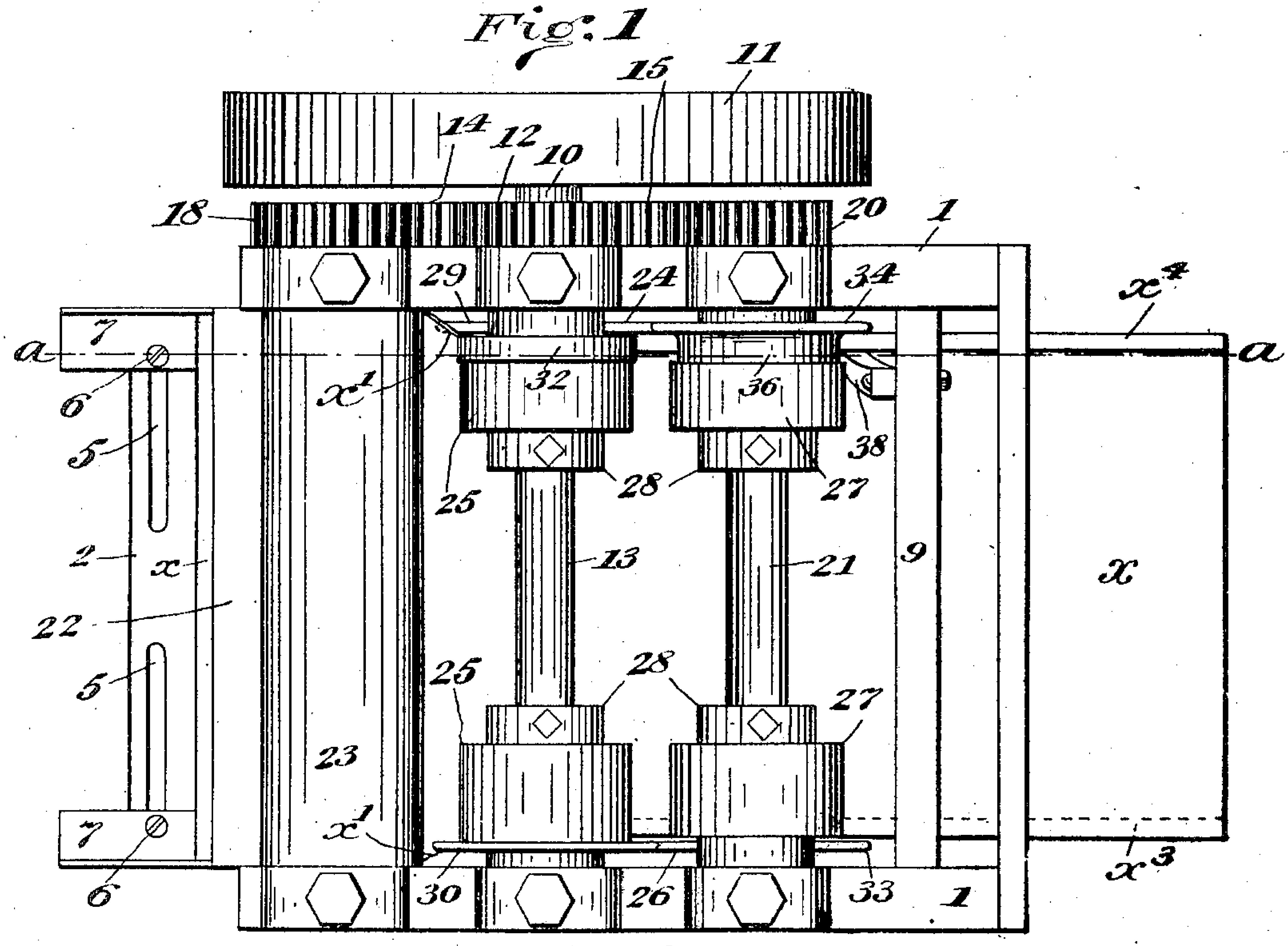

Fig: 2

Witnesses

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NO MODEL. 2 SHEETS—SHEET 2.

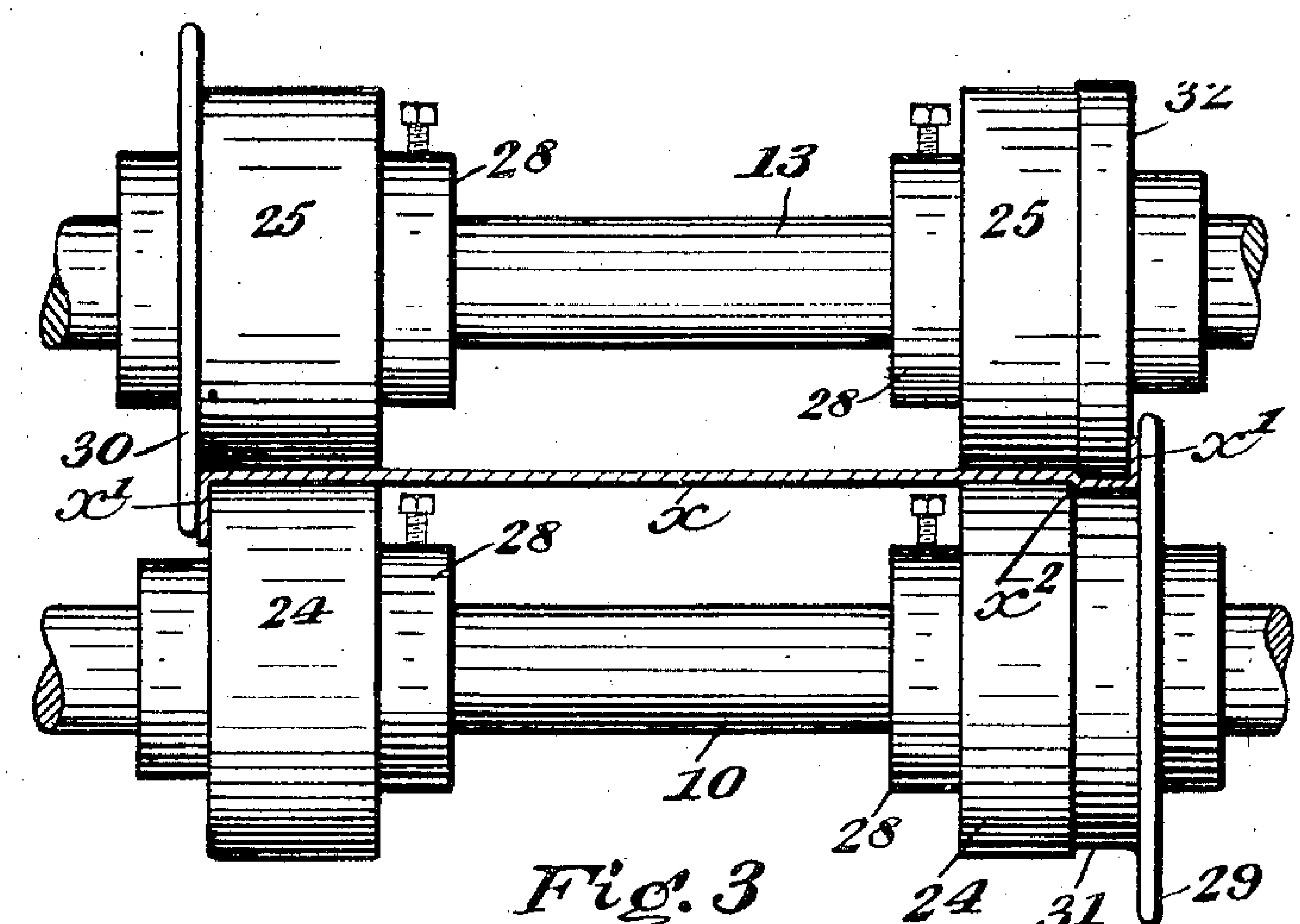


Fig. 3

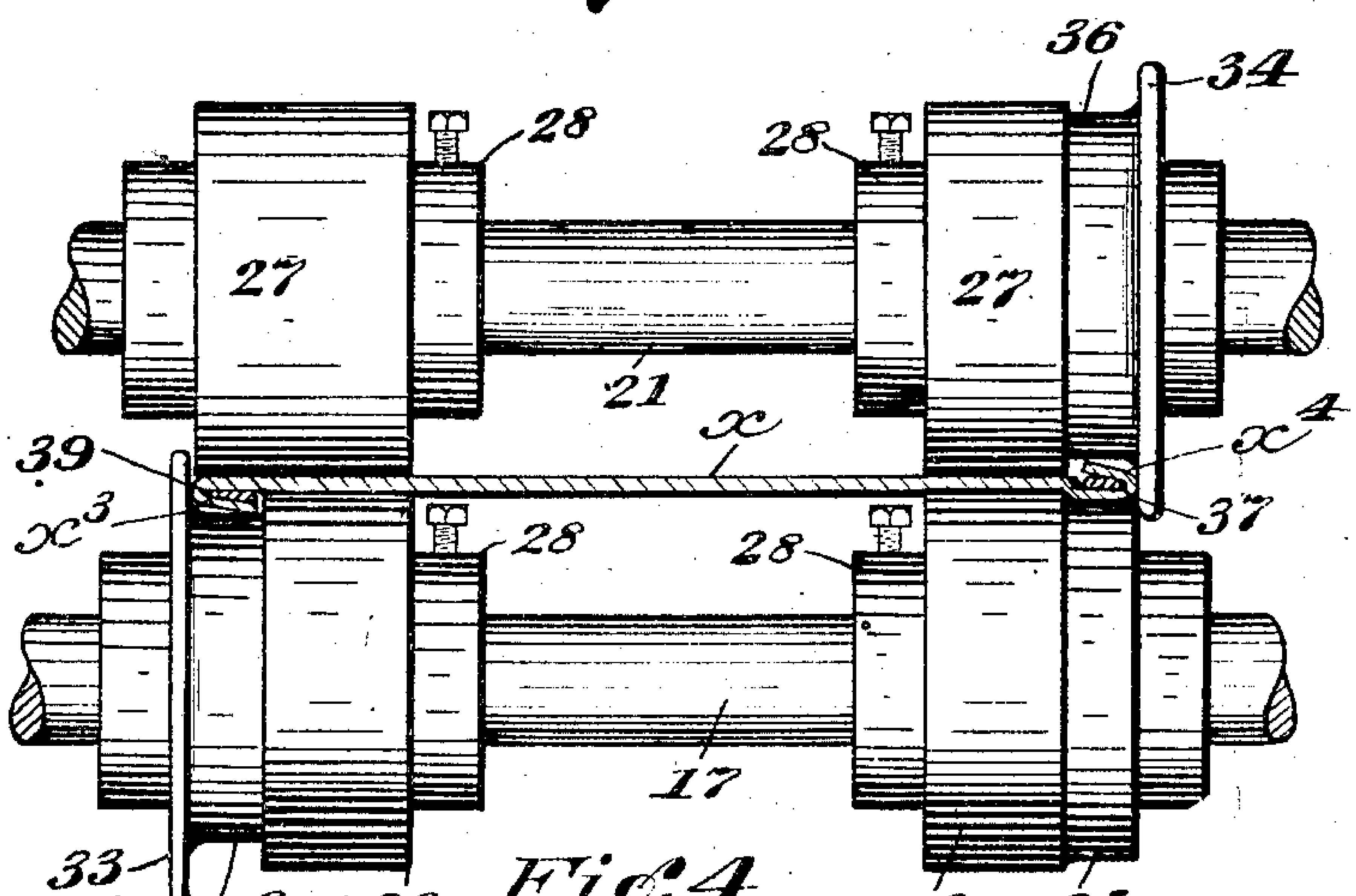


Fig. 4

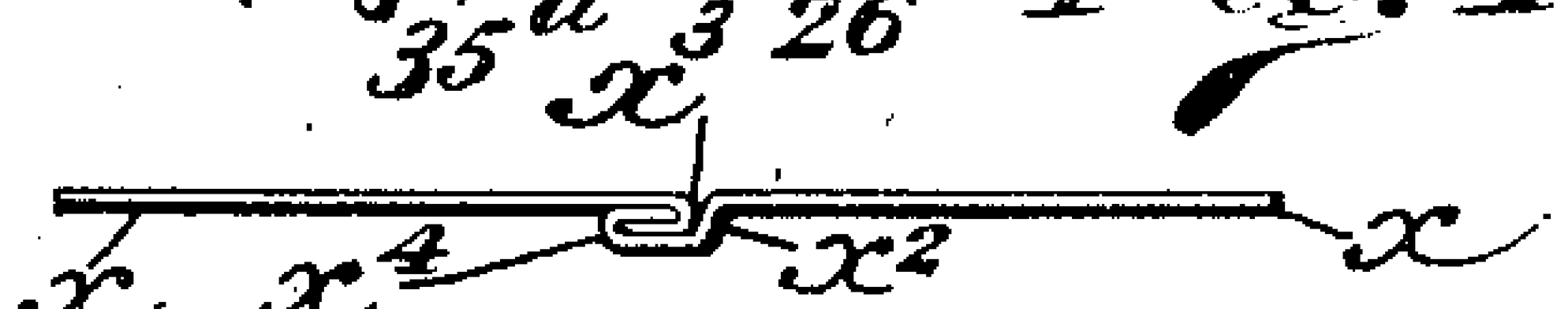


Fig. 8

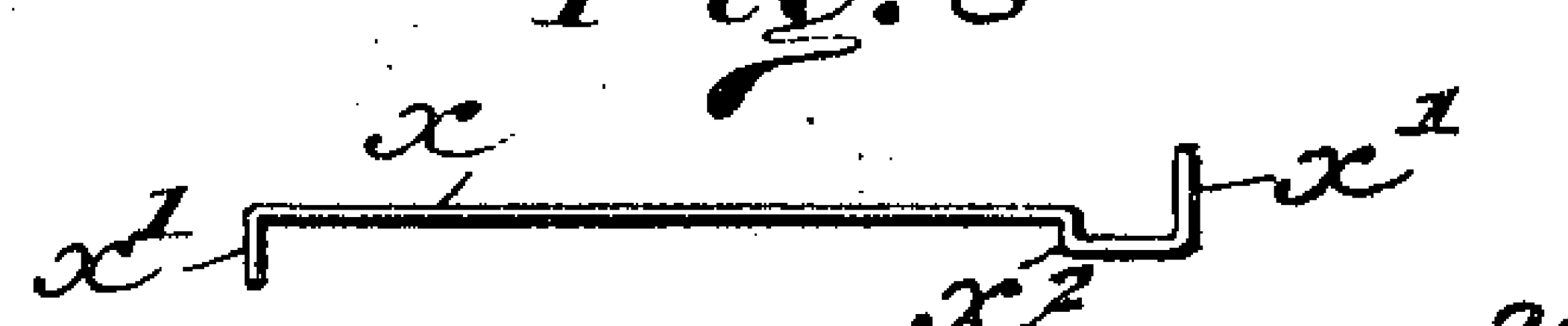


Fig. 6

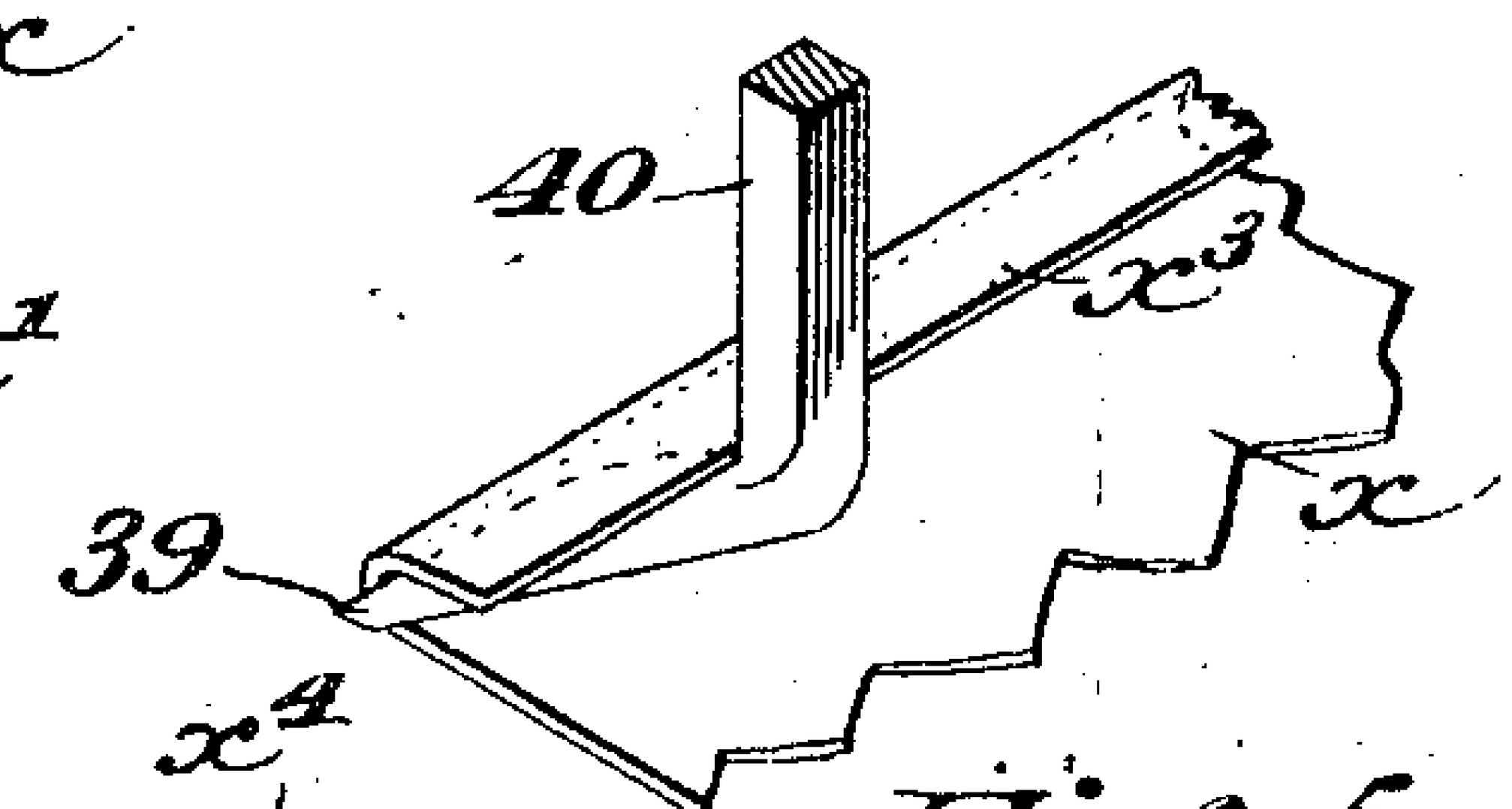
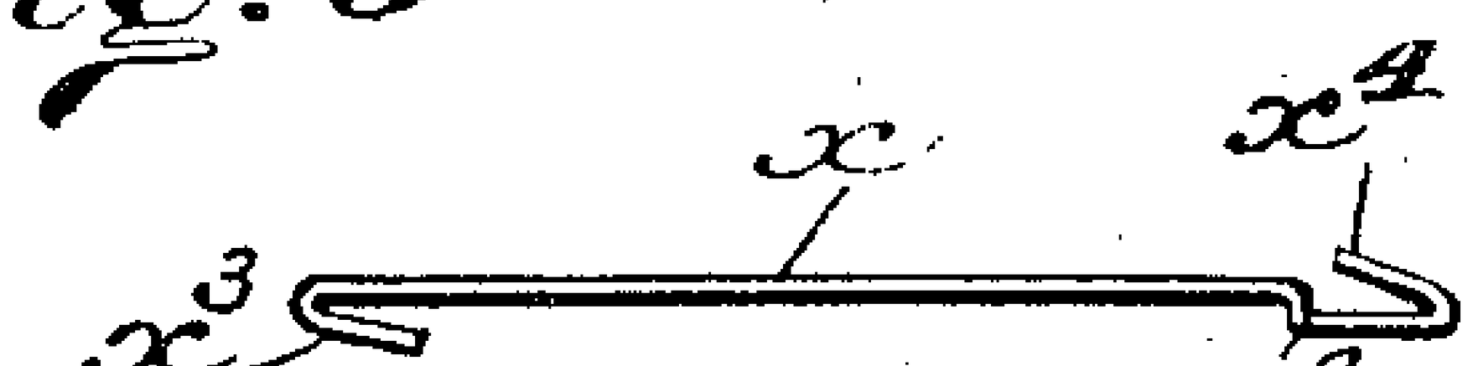


Fig. 5



Witnesses Fig. 7

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UNITED STATES PATENT OFFICE.

EDWIN F. LOCKWOOD, OF BELLEVUE, KENTUCKY.

SHEET-METAL-EDGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 754,786, dated March 15, 1904.

Application filed June 15, 1903. Serial No. 161,541. (No model.)

To all whom it may concern:

Be it known that I, EDWIN F. LOCKWOOD, a citizen of the United States of America, and a resident of Bellevue, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Sheet-Metal-Edging Machines, of which the following is a specification.

This invention relates to certain improvements in devices for bending or seaming sheet metals, such as are employed for producing upon the edges of metal sheets or plates the angular bends adapted to interlock when the edges are joined together or seamed; and the object of the invention is to provide a device of this general character of a simple and inexpensive nature and of a strong and durable structure which shall be adapted for operation in a substantially continuous manner, the metal sheets or plates being passed through between the bending or seaming devices successively without requiring the movement of said devices to be stopped, so that a greatly-increased capacity and output of work is effected.

The invention consists in certain novel features of the construction, combination, and arrangement of the several parts of the improved bending or seaming device, whereby certain important advantages are attained and the device is made simpler, cheaper, and otherwise better adapted and more convenient for use, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings, which serve to illustrate my improvements, Figure 1 is a sectional view taken vertically and longitudinally through the improved seaming or bending device, the plane of the section being indicated by the line *a a* in Fig. 2; and Fig. 2 is a plan view of the device. Fig. 3 is a partial vertical section taken through the device and showing the construction and arrangement of the first set of bending or seaming rolls thereof. Fig. 4 is a sectional view similar to Fig. 3, but showing the construction and arrangement of the second set of seaming or bending rolls of the device. Fig. 5 is an enlarged fragmentary perspective detail view showing (inverted) the structure and arrangement of the lower die or former over which one edge portion of the metal sheet or plate is bent in the operation of the device. Fig. 6 is a view drawn to a reduced scale and showing the formation of the bends produced in the metal sheets or plates by the first set or series of rolls of the device. Fig. 7 is a view similar to Fig. 6, but showing the bends produced in the sheet or plate after passage between the second series or set of rolls of the device. Fig. 8 is a view somewhat similar to the foregoing views, Figs. 6 and 7, but showing two edge portions having interlocked bends such as are produced by the improved bending or seaming device.

The improved bending or seaming device, as shown in these views, comprises a frame comprising side plates 1 1, spaced apart and connected at front and rear of the device by means of cross bars or braces 2 and 4, respectively, the forward cross bar or brace 2 being provided at opposite ends with longitudinal slots 5 5, through which are passed bolts 6 6, the lower ends of which, as seen in Fig. 1, have nuts and the upper ends of which have heads engaged with guides or gages 7 7 of angular cross-section, the vertical portions of which serve to engage the edges of the sheets or plates being fed into the machine, while the horizontal portions thereof form a rest or table at the forward part of the device, over which the materials are fed. By loosening the nuts on the bolts 6 the gages or guides 7 7 may be adjusted toward or from each other to accommodate the machine for receiving sheets or plates of metal of different widths.

Upon the cross bar or brace 4 at the rear or delivery end of the device is also supported a table 8, serving as a support over which the bent or seamed sheets or plates are passed when discharged from the device. At the rear or delivery end of the device is also arranged another cross bar or brace 9, extended in a plane over the path in which the sheets or plates are passed through the device in the operation thereof.

10 indicates a drive-shaft extended transversely of the frame below the path of the sheets or plates through the device and having one end provided with a band-wheel or pulley 11, adapted to receive a band or belt, so that

the device may be driven from a suitable source of power, and 12 indicates gearing at one side of the frame and by means of which the rotatory movement of shaft 10 is transmitted to a shaft 13, journaled transversely of the frame above shaft 10 and also above the path of the sheets or plates through the device.

Below the shaft 10 and at opposite sides thereof and at one of the side plates 1 are arranged other gear-wheels 14 and 15 by means of which the movement of shaft 10 is transmitted to other alined shafts 16 and 17, respectively, in front of and behind the shaft 10 and also below the path of the sheets or plates through the device. The movement of shafts 16 and 17 is also transmitted through gearing 18 and 20 to other alined shafts 19 and 21 above the plane of feed and located, respectively, above the forward and rear shafts 16 and 17.

From the above description it will be seen that the improved bending or seaming device comprises three sets of shafts geared to turn in unison and the plane of feed of the material passed through the device extends centrally between the shafts of each of these pairs, so that the several mechanisms carried upon the shafts of each pair are permitted to successively operate upon the plates or sheets as they are fed through the device, as will be hereinafter explained.

Upon the shafts 16 and 19 of the first pair are held lower and upper feed-rolls 23 23 of similar structure, between the bight of which the sheets or plates are passed, as indicated at x in the drawings, the movement of these rolls serving to impel the sheets or plates through the device when once they are gripped between the said rolls.

22 indicates a fender formed of a metal plate extended across the forward or feed end of the machine and beneath which the sheets or plate are fed into the bight of rolls 23 23, this fender serving to protect the hands of the operator from being caught in the rolls and also aiding in the insertion of the sheets or plates.

Upon the central pair of vertically-alined shafts 10 and 13 are held a series or set of rolls adapted to operate upon the edge portions of the sheets or plates x passed between them, such set or series comprising two lower rolls 24 24 and two upper rolls 25 25, the arrangement of the rolls upon these central shafts 10 and 13 being such that there is an upper and a lower roll 25 and 24, respectively, adjacent to each side plate 1 of the device and adapted to operate upon and bend each side portion of the metal sheet or plate fed through the device.

Upon the third or rearmost pair of vertically-alined shafts 17 and 21 are also held a series or set of rolls also adapted to operate upon the edge portions of the sheets or plates x passed between them, and this set or series of rolls comprises two lower rolls 26 26 and two upper rolls 27 27, the arrangement of these rolls upon the rearmost shafts 17 and 21 being also such that there is an upper and a lower roll 27 and 26 adjacent to each side plate of the frame and adapted to operate upon each edge portion of the sheet or plate of metal as it is fed through the device in the operation thereof.

The arrangement of the first set or series of bending-rolls upon the central pair of shafts 10 and 13 is shown in detail in Fig. 3 of the drawings, and the arrangement of the rolls of the second pair or set upon the rearmost shafts 17 and 21 is shown in detail in Fig. 4 of the drawings.

Where the sheet or plate metal to be bent or seamed is designed for use in the manufacture of stovepipe, spouts, cans, and similar articles, it will be understood that the bends upon one edge portion of the sheet or plate will be interlocked with those upon the opposite edge portion of the same sheet, whereby it will be evident that the bends upon opposite edge portions of the same sheet must be oppositely directed—that is, one bend must be upon one side surface of the sheet, while the other bend must be upon the other side surface, as indicated in Fig. 7, which shows the arrangement of the bends in such cases. To secure such an arrangement of the bends upon opposite edge portions of the sheets or pieces of metal, it is essential that the rolls at one side of the device shall be adapted to bend the edge portions of the sheets or plates upward, while the rolls at the other side of the device shall be adapted to bend the edge portions of the sheets downward, and to secure this result the lower roll 24 at one end of the drive-shaft 10 (the right-hand end, as shown in Fig. 3) is provided at its outer end with a peripheral projecting flange 29, adapted in the operation of the device to bend the edge portion of the metal sheet or plate upward over the adjacent end of the corresponding upper roll 25 on the end of the upper shaft 13, as indicated at x' in the drawings. In a similar way the upper roll 25 at the opposite end of the upper shaft 13 is provided with a peripheral projecting flange 30, as shown at the left-hand end of Fig. 3, which in the operation of the device is designed to bend the opposite or left-hand edge portion of the metal sheet or plate x downward over the end surface of the corresponding lower roll 24, as indicated at x' in the drawings.

From the above description it will be seen that the first set or series of rolls 24 and 25 upon shafts 10 and 13 is adapted to bend the edge portions of the metal sheets in such a way that they stand at about right angles from opposite surfaces of the sheets, as indicated in Figs. 3 and 6, and the second set or series of rolls 26 and 27 upon the rearmost shafts 17 and 21 is designed to flatten these angular bends x' x' over upon the surfaces of the sheets, so that they will be adapted to be interlocked with each other when the edge

portions are to be seamed together, the flattened edge portion at one side of the sheet being indicated at x^3 and that at the other side of the sheet being indicated at x^4 in Figs. 4 and 7 of the drawings.

For flattening the bends x' x' a reverse arrangement of flanges upon the second set or series of rolls is employed, and in connection with the rolls of said second set or series there are provided dies or formers above and below the metal sheet or plate x and over and beneath which the said edge portions of the sheet are adapted to be bent, the function of such dies or formers being to prevent the edge portions of the sheets from being bent flush upon the side surfaces of the sheets and to hold the edges apart from the side surfaces, as indicated in Figs. 4 and 7, so that the edge portions x^3 and x^4 may be interlocked with each other.

Accordingly it will be seen that the roll 27 at the right-hand end of the upper rear shaft 21 is provided with a peripheral projecting flange 34, adapted to project down upon and overlap the adjacent end surface of the corresponding lower roll 26 at that end of shaft 17, while the lower roll 26 at the other or left-hand end of the lower rear shaft 17 is provided with a similar peripheral projecting flange 33, overlapping the end surface of the corresponding upper roll 27 upon shaft 21. Between the rolls 26 and 27 at the right-hand ends of the rear shafts 17 and 21, as the parts are shown in Fig. 4, and upon the upper side of the metal sheet x is also arranged the die or former for the edge portion x^4 of the metal sheet, while between the rolls 26 and 27 at the left-hand ends of said shafts, but upon the lower side of the metal sheet x, is arranged the die or former for the left-hand side portion x^3 of the metal sheet. By this arrangement of the flanges upon the rolls of the second set or series it will be seen that the angular edge portions x' x' of the sheet are prevented by said flanges from outward movement toward the side frames of the device and are caused to be engaged by the peripheral portions of the corresponding rolls in such a way as to flatten said portions over inward upon the interposed dies or formers 37 and 39, one edge portion x^3 being flattened beneath the under surface of the sheet x, while the other edge portion is flattened above the upper surface of the sheet, as clearly shown in Figs. 4 and 7 of the drawings. To receive the flattened edge portion x^3 upon the under side of the sheet x, the left-hand lower roll 26 on the rear lower shaft 17 is provided with a peripheral recess or groove 35^a, the remaining ungrooved portion of the periphery of said roll 26 being adapted to bear upon the central plane portion of the metal sheet x, so as to impel the same through the device, and for a similar purpose the right-hand upper roll 27 upon the upper rear shaft 21 is peripherally grooved, as seen at 36, to receive the flattened edge portion x^4.

The upper die or former 37 has an upwardly-directed shank or stem 38, which is extended upward and has connection with the upper cross bar or brace 9 at the rear of the frame, and the lower die or former has, as seen in Fig. 5, a similar shank or stem 40, which is extended downward and has connection with the frame in any desired way.

In order to accommodate the bending or seaming mechanisms comprising the two sets or series of rolls for operation in connection with sheets or plates of different widths, I provide each of the said rolls with a reduced boss 28, carrying a set-screw, whereby the roll may be securely held to the shaft whereon it is mounted. By loosening these set-screws the rolls are capable of adjustment lengthwise of the shafts toward and away from each other, so as to properly engage the edge portions of metal sheets of different widths in a way which will be readily understood.

Where articles are made from heavy metal—such as stovepipe, down-spouts, and the like—it is customary to crease one edge portion of the sheet so that the seam produced by interlocking the bent or flanged edges may be flush upon the outside of the pipe or spout, and for effecting this result I provide one of the lower rolls 24 of the first set or series (being that roll 24 shown at the right-hand end of Fig. 3) with a peripheral groove or channel 31, into which the sheet-metal piece x is pressed by a peripheral projection 32, produced upon the corresponding upper roll 25, as indicated at x^2 in Figs. 3, 6, and 7. To prevent straightening out of the crease x^2 thus formed while the sheet x is being passed between the upper and lower rolls of the second set or series, I provide the right-hand lower roll 26 of said second set or series with a peripheral groove or recess 35, in which the creased or offset edge portion of the sheet x is received, as shown clearly in Fig. 4 of the drawings.

In the operation of the improved bending or seaming device the sheets or plates of metal are successively fed over the guides or gages 7 7 and beneath the fender 22 to the bight of the feed-rolls 23, by which said sheets or plates are gripped and carried into the device and presented first between the rolls of the first set or series, which produce right-angled bends upon the edge portions of the sheets, and finally between the rolls of the second set or series, which act to bend or flatten the previously-formed right-angled bends over inward to produce the finished product, as indicated in Fig. 7, after which the sheet or plate is discharged from the device over the rear table or rest 8.

Where it is desired to bend or flange heavy metal—such as is employed in the manufacture of stovepipes, down-spouts, and the like—it is very desirable to employ the means for pro-

ducing the crease or offset x^2; but where the device is employed for working light metal—such as is commonly used for small pails, cans, and light tubing and the like—it is not so desirable to produce a flush exterior surface upon the finished article, and consequently the creasing means above referred to may be dispensed with.

From the above description it will be seen that the device is of an extremely simple and inexpensive nature and is especially well adapted for use, since it is capable of operation in a substantially continuous manner to flange or bend the edges of the sheets, and consequently affords a greatly-increased output of work over what has been secured from devices such as have heretofore been employed. It will also be obvious from the above description that the device may be employed with equal facility upon all kinds of sheet metal which it is possible to join by seaming, and I do not desire to be understood as limiting myself to the employment of the device for seaming metals for any particular purpose. Not only may sheet metal for the manufacture of stovepipes, down-spouts, and cans be seamed or flanged by the device, but metals for the manufacture of roofing, pails, and various tubular articles may also be flanged by means of the device; nor do I wish to be understood as limiting myself to the employment of the precise structure herein shown and described in carrying out my invention in practice, since it is evident that the device is capable of considerable modification without material departure from the principles and spirit of the invention.

Having thus described my invention, I claim—

1. A device of the character described comprising two parallel series of driven shafts, each series comprising an upper and a lower shaft parallel with each other, two sets of corresponding edging-rolls held on each series of shafts, each set of rolls being adapted to bend an edge portion of a metal sheet passed between them and dies or formers extended between the respective rolls of each set on one series of shafts and around which the metal sheet is adapted to be bent.

2. A device of the character described comprising two parallel series of driven shafts, each series comprising an upper and a lower shaft parallel with each other, two sets of corresponding edging-rolls held on each series of shafts, each set of rolls being provided with set-screws for holding them to their respective upper and lower shafts, and being adapted to bend an edge portion of a metal sheet passed between them and dies or formers extended between the respective rolls of each set on one series of shafts and around which the metal sheet is adapted to be bent.

3. A device of the character described comprising two parallel series of driven shafts, each series comprising parallel upper and lower shafts, two sets of corresponding edging-rolls held on each series of shafts and adapted to bend opposite edge portions of a metal sheet passed between them, one roll of each set being provided with a peripheral projection adapted to bend an edge of the metal sheet over an end of the other roll of that set, and one roll of each set on one series of shafts having a circumferential recess in which the bent edge portion of the metal sheet is adapted to be received and dies or formers extended between each set of rolls on that series of shafts and held in said circumferential recesses.

4. A device of the character described comprising two parallel series of driven shafts, each series comprising parallel upper and lower shafts, two sets of corresponding edging-rolls held on each series of shafts and adapted to bend opposite edge portions of a metal sheet passed between them, each set of rolls on one series of shafts being alined with a set of rolls on the other series of shafts and being adapted to bend an edge of the metal sheet in a direction opposite to that in which the opposite edge of such sheet is bent by the other set of rolls on that series of shafts and dies or formers extended between the rolls of each set on one series of shafts and having oppositely-directed supporting-shanks.

5. A device of the character described comprising two parallel series of driven shafts, each series comprising parallel upper and lower shafts, two sets of corresponding edging-rolls held on each series of shafts and adapted to bend opposite edge portions of a metal sheet passed between them, each set of rolls on one series of shafts being alined with a set of rolls on the other series of shafts and being adapted to bend an edge of the metal sheet in a direction opposite to that in which the opposite edge of each sheet is bent by the other set of rolls on that series of shafts, dies or formers extended between the rolls of each set on one series of shafts and having oppositely-directed supporting-shanks, feed-rolls extended in front of said parallel upper and lower shafts with their bight arranged to grip a metal sheet to direct it between the edging-rolls, a feed-table extended in front of the feed-rolls and over which metal sheets are adapted to be fed and a fender also extended in front of the feed-rolls and formed of a metal plate the lower edge of which is spaced above the feed-table to permit a metal sheet to be fed over said table beneath the said edge of the fender.

Signed at Cincinnati, Ohio, this 11th day of June, 1903.

EDWIN F. LOCKWOOD.

Witnesses:
JOHN ELIAS JONES,
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