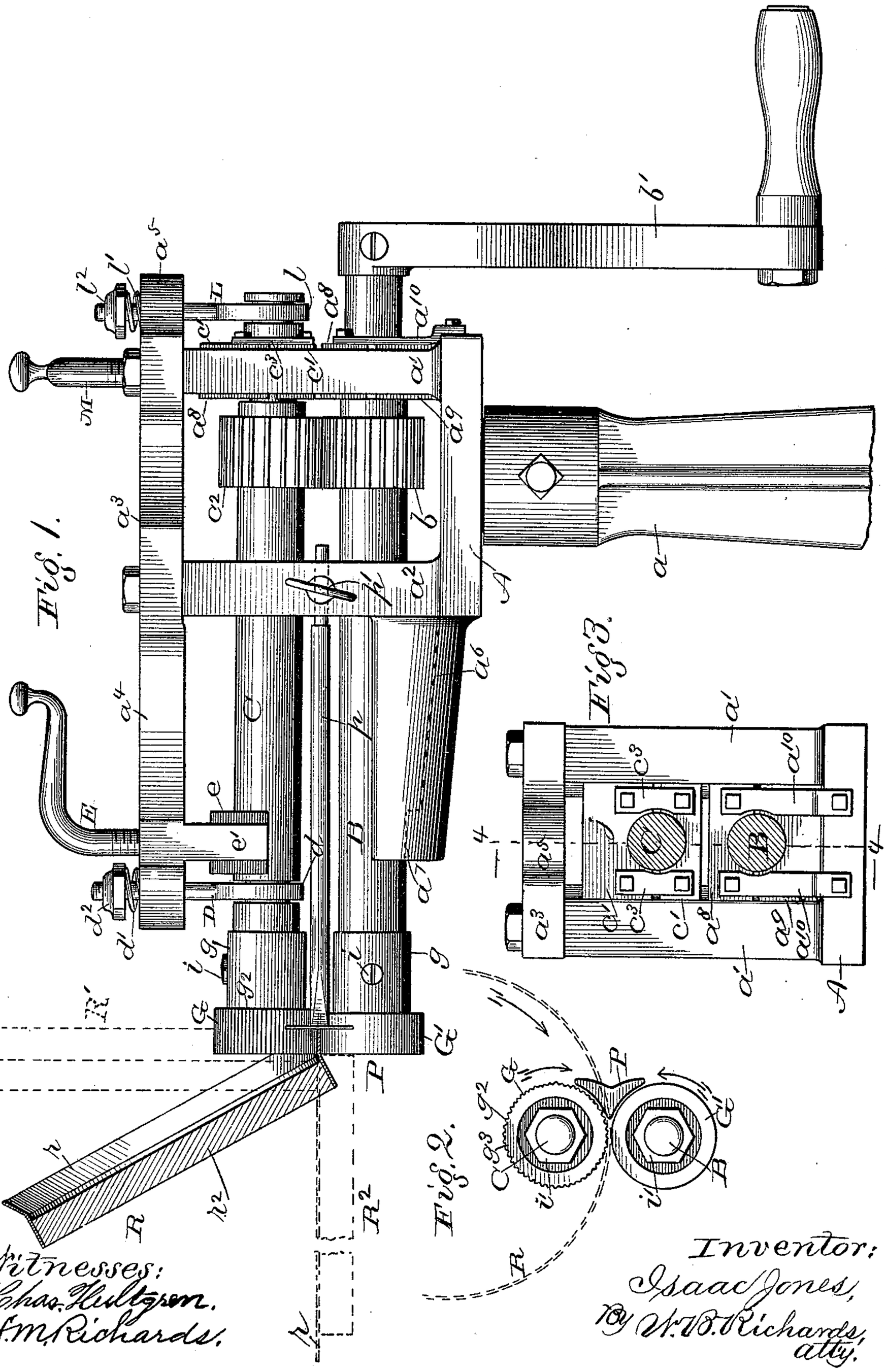
(No Model.) 3 Sheets—Sheet 1.

I. JONES.

FLANGING MACHINE.

No. 582,863. Patented May 18, 1897.



(No Model.) 3 Sheets—Sheet 2.

I. JONES.

FLANGING MACHINE.

No. 582,863. Patented May 18, 1897.

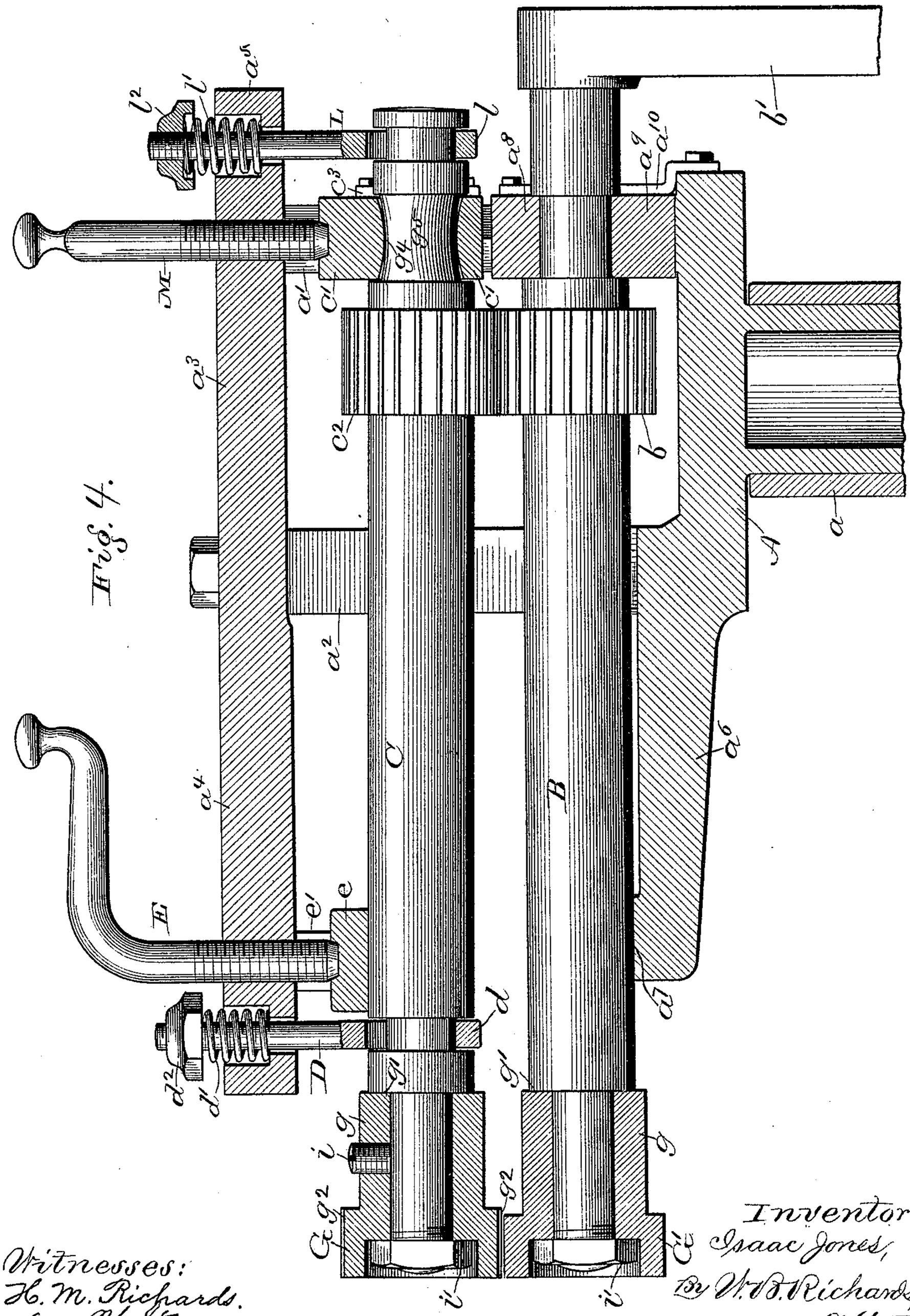


Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

I. JONES.

FLANGING MACHINE.

No. 582,863. Patented May 18, 1897.

Fig. 7.

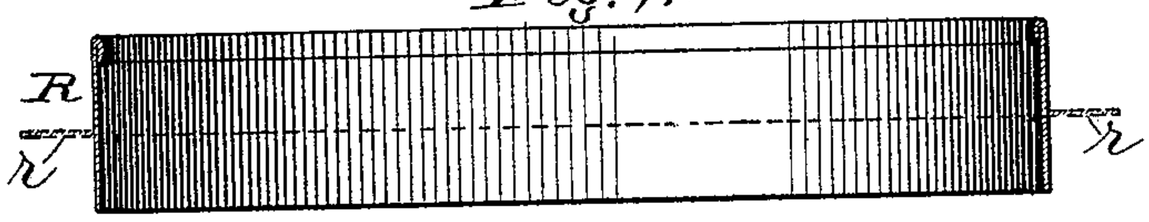


Fig. 8.

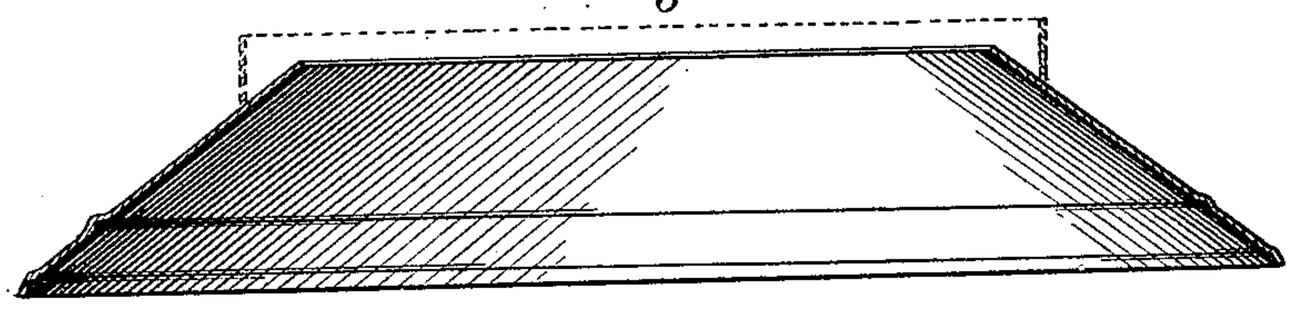


Fig. 9.

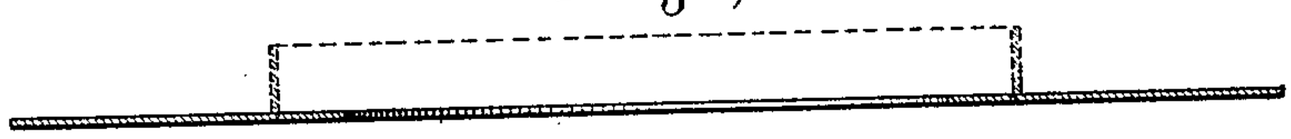


Fig. 5.

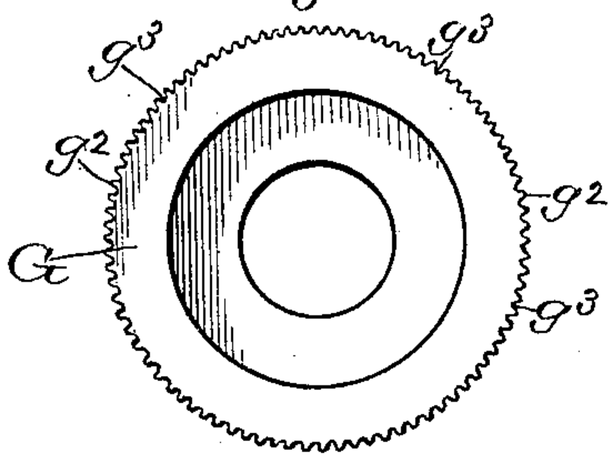


Fig. 10.

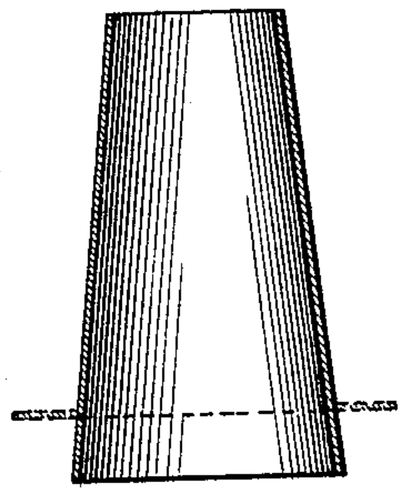
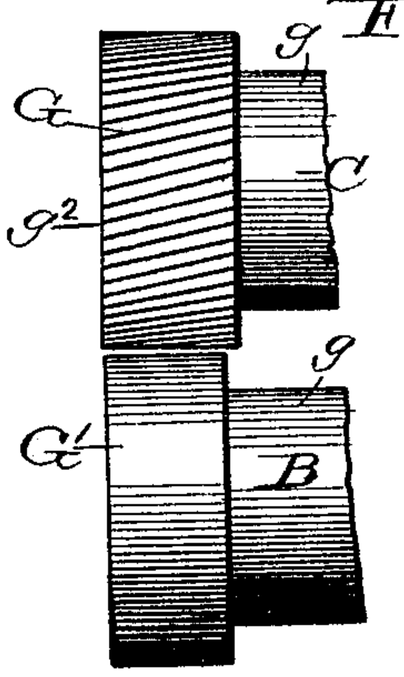


Fig. 6.



Witnesses:
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H. M. Richards.

Inventor:
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UNITED STATES PATENT OFFICE.

ISAAC JONES, OF GALESBURG, ILLINOIS.

FLANGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 582,863, dated May 18, 1897.

Application filed January 29, 1894. Serial No. 498,311. (No model.)

To all whom it may concern:

Be it known that I, ISAAC JONES, a citizen of the United States, residing at Galesburg, in the county of Knox and State of Illinois, have invented certain new and useful Improvements in Flanging-Machines, of which the following is a specification.

This invention relates to means for turning or forming flanges on tin or other sheet-metal articles of various kinds and forms—such as cylinders, frustums of cones, and other analogous forms—by expanding the metal by means of rollers, between which it is passed as the flange is turned. So far as my knowledge of such machines extends I am not aware of any having been made or patented which are practically successful for turning other than very narrow flanges on such articles, mainly for the reason that their effectiveness in expanding the metal is very limited, and where wider flanges are to be turned on articles of such metal resort is still had to the old method of using a burring-machine or other machine to form a groove or mark for the base of the flange and then as the article is being revolved by hand or other power hammering the flange by hand with the peen end of a hammer to expand it, so that the flange may be turned as it is hammered.

The leading object of my invention is to furnish a flanging-machine with greatly-increased effectiveness over previous machines for the purpose not only in its increased capacity of turning wider flanges, but also in its increased effectiveness for turning flanges more rapidly and with more uniform expansion of the metal of the flange, and hence less cracking or breaking thereof, and not only producing these extended and materially better effects, but producing them much more economically than were the limited effects produced by prior machines.

The invention which I have developed with the foregoing-recited object in view, when embodied in concrete form in a working machine, consists in its main feature in a combination of two rollers, one of which has a smooth peripheral or outer surface which extends to its outer end and the other has a fluted or corrugated peripheral or outer surface which also extends to its outer end, and one of which rollers is adjustable lengthwise of itself at different angles to the other roller, and which are arranged to be rotated by any suitable driving mechanism in such proximity that the sheet-metal article being operated upon will, while being drawn through between the rollers, be rapidly and uniformly stretched or expanded by the outer surfaces of the teeth or ledges of the corrugated roller successively striking and pressing upon and expanding the metal of the different parts of said flange as it (the flange being formed) passes through between said corrugated roller and the smooth roller, which rollers are mounted so as to facilitate passing various forms of sheet-metal articles between them while bending and expanding the metal to form the flanges, as hereinafter described and made the subject-matter of claims hereto appended.

In carrying out these main objects of my invention improvements have been evolved which consist in novel structural features, novel organizations of parts, and novel combinations of parts, the separate and collective operations of which parts, their structural peculiarities, novel organizations, and novel combinations are hereinafter fully described, and which are also respectively made the subject-matter of claims hereto appended.

In the accompanying drawings all my improvements are shown as embodied in the best way now known to me. Obviously, however, while still within the purview of my invention some of these parts may differ in their construction and assemblage or disposition for coaction from my flanging-machine shown in the accompanying drawings, in which—

Figure 1 is a side elevation of a machine embodying my improvements and sectional elevation of a cylinder being operated upon by the flanging-rollers; Fig. 2, an end elevation of the flanging-rollers and gage and showing in broken lines part of a cylinder in position for flanging; Fig. 3, an end elevation of the right-hand end of the frame of the machine and the journal-bearings and sectional elevation of the roller-carrying shafts; Fig. 4, an enlarged side elevation of parts and sectional elevation of other parts, including the flanging-rollers, in the line 4 4 in Fig. 3; Fig. 5, an enlarged end elevation of the corrugated roller; Fig. 6, an enlarged side elevation of

the flanging-rollers, showing a modification of the corrugations oblique to the axis of rotation. Figs. 7, 8, 9, and 10 are sectional elevations, in full lines, of articles of sheet metal, including, respectively, a cylinder, a frustum of a cone, a disk annulus, and another frustum of a cone, with parts of each turned down or over to form a flange. (Shown in dotted lines.)

The framework on which the operating parts of the machine are mounted may be briefly described as follows:

The letter A designates the base of the framework; a, the supporting-standard; a', a pair of standards projecting upward from the base A; a^2, another pair of standards, and a^3 a cap-plate supported by said standards and having overhanging ends a^4 and a^5. A bracket-arm a^6 projects horizontally from the base A and standards a^2 and has one of the bearings a^7 in its outer end for the ordinary shaft B, which shaft has another bearing in the bearing-blocks a^8 a^9, which are seated at the base of and between the standards a' and secured against upward movement with reference thereto by straps a^{10}, which are bolted to said bearing-blocks and to the base-plate A. The shaft C is journaled at one end in bearing-blocks c', which slide vertically in guideways between the standards a'. Near its other end the lower side of the shaft C has a bearing d at the lower end of a hanger D, the standard of which projects through a hole in the overhanging arm a^4 and is encircled by a thrust-spring d', which rests between the arm a^4 and a nut d^2 on said standard, and by its thrust-force action tends to raise that end of the shaft C. The threaded end of a hand or crank set-screw E passes through a screw-threaded hole in the arm a^4 and contacts with the upper surface of a bearing-block e, which slides vertically in guideways between arms e', pendent from the arm a^4, and has a grooved under surface which fits on the upper surface of said shaft as an upper bearing-block therefor, so that by turning the crank set-screw E the block e will be forced downward to positively lower and positively hold the adjacent end of the shaft C against the force action of the spring d', and by turning the crank-screw E in an opposite direction the block e will be raised and the spring d' will then raise the bearing d and therewith the adjacent end of the shaft C. The shaft B carries a pinion b, which gears with a pinion c^2 on the shaft C, whereby an operating-crank b' on the shaft B will simultaneously rotate both of said shafts at uniform velocities, but in opposite directions.

The adjustment of the roller-carrying end of the shaft C toward or from the shaft B, the plain unadjustable journal-bearings at their other ends, the gearing together of said shafts, the operating-crank, and the framework hereinbefore described are of ordinary construction and do not require any fuller description herein.

The coacting rollers G G′ are each preferably cylindrical in form or of substantially the same diameter throughout their lengths, but one or both of them may, if preferred, be of frusto-conical form or tapered toward the outer end, an essential particular, however, being that neither roller shall have any projection outwardly in the form of an annular flange or otherwise on its outer end, nor any annular groove on the outer end, nor any projection which would interfere with the operation of turning a flange over said end, as hereinafter described. Each roller G G′ has a boss g projecting from its inner end. The rollers G G′ are hollow and are preferably secured on reduced portions on the outer ends of their respective shafts B and C by means of set-screws i and nuts i' in an ordinary manner and with their inner ends resting each against a shoulder g' of the shaft on which it is mounted, but they may be fixed upon the projecting or overhanging ends of their respective shafts by any preferred means which will hold them securely and firmly in place and the boss g be dispensed with, if preferred.

The roller G has a corrugated or fluted outer surface or periphery formed of projecting ledges g^2, with intervening grooves or interspaces g^3. The ledges g^2 may be either parallel with the axis of the roller, as shown at Figs. 1, 2, and 5, or oblique to said axis, as shown at Fig. 6, and are preferably V-shaped in their cross-sections, with their outer narrow parts rounded off in the form or approximately in the form of the peen end of a hammer, substantially as shown best at Fig. 5. As an essential feature the ledges g^2 extend to the end of the roller G. The roller G′ has a smooth outer surface, and as an essential feature thereof this surface extends to its outer end, so as not to interfere with the operation of turning a flange over said outer end. The shaft C, at its back end or distant end from the roller G, (see Fig. 4,) has a circumferential groove g^4, which is concave in its bottom portion in its cross-section and forms a journal g^5, which rotates in a journal-bearing consisting of bearing-blocks c' c', having an approximate conformity of outline to the journal g^5, but preferably with arcs of shorter radius than the arc of the journal g^5, as shown at same figure, and for the purpose of permitting adjustments of the shaft C by raising and lowering its other end without affecting the journal-bearings. The blocks c' c' are coupled together by straps c^3 and slide vertically in guides between the standards a', and the adjacent end of the shaft C rotates on a lower bearing l at the lower end of a hanger L, the upper end of which passes through the cap-plate a^3 and has a thrust-spring l' encircling its upper end between a nut l^2 and the end a^5 of the cap-plate. The lower end of the crank set-screw M acts on the upper bear-

ing-block c' and is screw-threaded through the cap-plate a^3, so that by turning the set-screw in one direction the journal-bearings c' and hanger L will be forced downwardly, compressing the spring l' to adjust and hold the adjacent end of the shaft C in lower positions, and by turning the set-screw in an opposite direction the spring l' will raise the hanger and thereby raise the adjacent end of the shaft C and the bearings c' until the upper bearing-block c' again comes into contact with the lower end of the set-screw M.

By adjustments of the back or rear end of the shaft C as last described the angle or inclination of this shaft in respect to the shaft B can be adjusted, and thereby the angle or inclination of the roller G with respect to the roller G′ be adjusted so that its inner end will be closer to the roller G′ than its outer end, as shown at Fig. 4, and so that the degree or extent of its inclination with reference to the roller G′ may be varied to suit different kinds and thicknesses of sheet metal, different widths of flanges being made and as may be desired for controlling the work of the rollers in other respects. The yielding spring l' will to a slight extent permit the other end of the shaft C and the roller G to yield away from the roller G′ to facilitate the passage between the rollers of seams or other projections on the flange being formed. Other ordinary means may be used for adjusting the bearings c', whereby they will be held against movement after adjustment, and thereby after the set-screw E is adjusted will prevent the roller G yielding away from the roller G′.

Ordinary unadjustable bearing-blocks may, if so desired, be used instead of the blocks c' with the main features of my improvements, and such bearing-blocks may also have surfaces of ordinary construction operating with an ordinary cylindrical journal on the shaft C, in which case the bearings are fixed to hold the roller G in such positions when in operation that the outer adjacent parts of the surfaces of said roller and of the roller G′, which parts are in the plane of centers of said rollers, will be inclined to each other, as shown best at Fig. 4, but in all cases, whether the journal-bearings c' and the adjacent end of the shaft C are adjustable or unadjustable, such bearings should by slight looseness or otherwise permit of ready and quick adjustments of the other end of said shaft and the roller G by means of the set-screw E and hanger D or otherwise, whereby the roller G may be easily and quickly raised slightly to permit of entering the sheet metal of the unformed flange between the rollers G and G′ to adjust the roller G with reference to the roller G′ for said interposed metal of different thickness, and for the purpose of increasing or diminishing the force action of said rollers on the sheet metal as may be required with different kinds or quality of metal, and for the purpose of adjusting the roller G nearer to the roller G′, whereby the rollers will exert the necessary force action on the interposed sheet metal as it becomes thinner by each successive revolution thereof between said rollers in turning a flange, as hereinafter described.

The outer ends of the corrugations on the roller G are in the same vertical plane as the outer end of the roller G′, whereby the metal of the flange will be expanded fully to the inner edge of the flange, where it is turned over the end of either roller.

The width of the flange being turned is regulated by an ordinary adjustable gage-plate P, carried on the end of an arm p, which is adjustable endwise of itself on one of the standards a^2, through which it passes and is fixed after adjustment by a set-screw p'.

An annulus or short cylinder R, of sheet metal, such as shown at Fig. 7, is shown by dot-lines R′ at Fig. 1, with one end thereof inserted between the rollers G G′ to the gage-plate p as a preliminary proceeding to turning a flange r thereon, the roller G having been raised by the spring d' to permit of such insertion and having then been forced down by the set-screw to the interposed cylinder or annulus R, as shown, and with such pressure as desired and required. The rollers G G′ thus brought into forcible contact with the interposed part r of the cylinder R and being rotated by the crank b' or otherwise will feed or draw the cylinder R forward in a circular direction between the rollers G G′, as indicated by the arrows at Fig. 2, and in so doing the interposed part of said cylinder passing between the rollers, which are nearer together at their inner ends than at their outer ends, will be expanded circumferentially of the cylinder and in an increasing extent from the inner side of the flange to its outer side or side of greatest circumference and thereby turned outwardly, which outward turning may be facilitated by the hand of the operator while holding the cylinder R in place and the cylinder be brought into the position shown by a sectional elevation thereof in full lines at Fig. 1, when a continuation of the same operations will still further expand the interposed part of the cylinder until it (the cylinder) is turned down to the position shown by dot-lines R^2 at same figure and the flange r thereby completed as an annular outwardly-projecting flange from the cylinder R, such as shown by dot-lines at Fig. 7. In thus turning the flange r no adjuncts or incidental aids further than hereinbefore described are indispensable. As an adjunct or incidental aid, however, a circular disk r^2, of wood or other suitable material, may be inserted in the cylinder R to extend to or nearly to the line between the flange r and the body part r' of the cylinder R, as shown by the full-line representation of the one-half part of the cylinder R at Fig. 1, and for the purpose of aiding in preserving the true circular form of the cylinder R as the flange is being turned thereon.

The roller G may be placed above the roller G′, as shown, or in any radial direction therefrom that may be desired, and in turning a flange the cylindrical or tubular shaped article on which the flange is to be turned may be placed over the end of either roller and turned over the end of the other roller, or, as may be otherwise described, it may be placed over the end of the roller G′ and turned upwardly over the outer end of the roller G in an evident manner and in a reverse operation from that shown at Fig. 1, where it is placed over the end of the roller G and turned downwardly against the outer end of the roller G′, and in all such relative positions of the rollers their action in forming the flange will be the same—that is, the metal of the flange will, without cracking or breaking, be rapidly and uniformly expanded circumferentially of the flange, and by reason of the divergence of the rollers toward their outer ends, with the greater expansion at the outer edge or rim of the flange, and with an unbroken or continuous expansion thereof uniformly diminishing in degree and extending from the outer edge to the inner edge of the flange.

In ordinary tinware and other lighter grade sheet-iron articles, and with the pressure of the rollers properly adjusted thereon, from two to four revolutions of the article by means of the rollers will turn an outward annular flange at right angles to the cylinder or tubular-shaped article it is turned on, such as the flange *r*. It will be evident that flanges may be turned by less expansion of the metal, at different angles to the articles they are turned on, and that the machine may be used, in an evident manner, in turning flanges, such as shown by the dot-lines on cylindrical and annular disk-shaped articles, as illustrated at Figs. 7 and 9, and at various angles on cones, as illustrated at Figs. 8 and 10, and on various other shaped articles, and also be used for expanding metal hoops and other similar articles.

By means of the joint action of the corrugated roller and the smooth roller, by means of which the interposed metal can be so efficiently expanded, as above described; by means of said rollers diverging in their plane of centers, by which means the metal of the flange is expanded in a uniformly-diminishing degree from the outer to the inner edge of the flange, and by means of said rollers having their respective working faces extended to their outer ends, and not having either an annular flange or an annular groove on their respective outer ends, all combined to operate as hereinbefore described, the flanging-machine herein shown and described is made thoroughly efficient for turning narrow flanges and flanges of same width on articles of different kinds, and without aid from auxiliary machines to partly form the flange.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a flanging-machine, and in combination substantially as described, a smooth roller having the same cylindrical form and diameter to its outer end, a corrugated roller, the corrugations of which terminate at its outer end, which is approximately in the same vertical plane as the outer end of said smooth roller, and rotatable shafts carrrying said rollers.

2. In a flanging-machine, in combination, a smooth roller, a corrugated roller, the corrugations of which terminate at the outer end of said roller in or approximately in the same plane as the outer end of the smooth roller, rotating shafts carrying said rollers on their outer ends, and means for adjusting one of said shafts at its roller-carrying end whereby the adjacent surface of said rollers may be brought nearer to or farther from each other, substantially as described.

3. In a flanging-machine, a combination comprising a smooth roller G′, spring-supported hanger D, bearing *e* with adjustable set-screw E, hanger L, a corrugated roller G, shaft C with a circumferential groove g^4, and bearing-blocks *c′* with arcs of shorter radius in their cross-sections than the arcs of the groove g^4, substantially as described.

4. In a flanging-machine, a combination comprising a smooth roller G′, corrugated roller G, hanger D, bearing *e*, set-screw E, hanger L, shafts B, C, journals g^4, bearings *c′* and set-screw M, substantially as described.

5. In a flanging-machine, and in combination, a smooth roller, a corrugated roller, the corrugations of which terminate at the outer end of said roller in same plane as the outer end of the smooth roller, rotating shafts carrying said rollers on their outer ends, and means for adjusting one of said shafts at both of its ends, whereby the adjacent surfaces of said rollers may be adjusted at different distances from, and in different angular relations to each other, substantially as described.

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

ISAAC JONES.

Witnesses:
CHAS. HULTGREN,
H. M. RICHARDS.