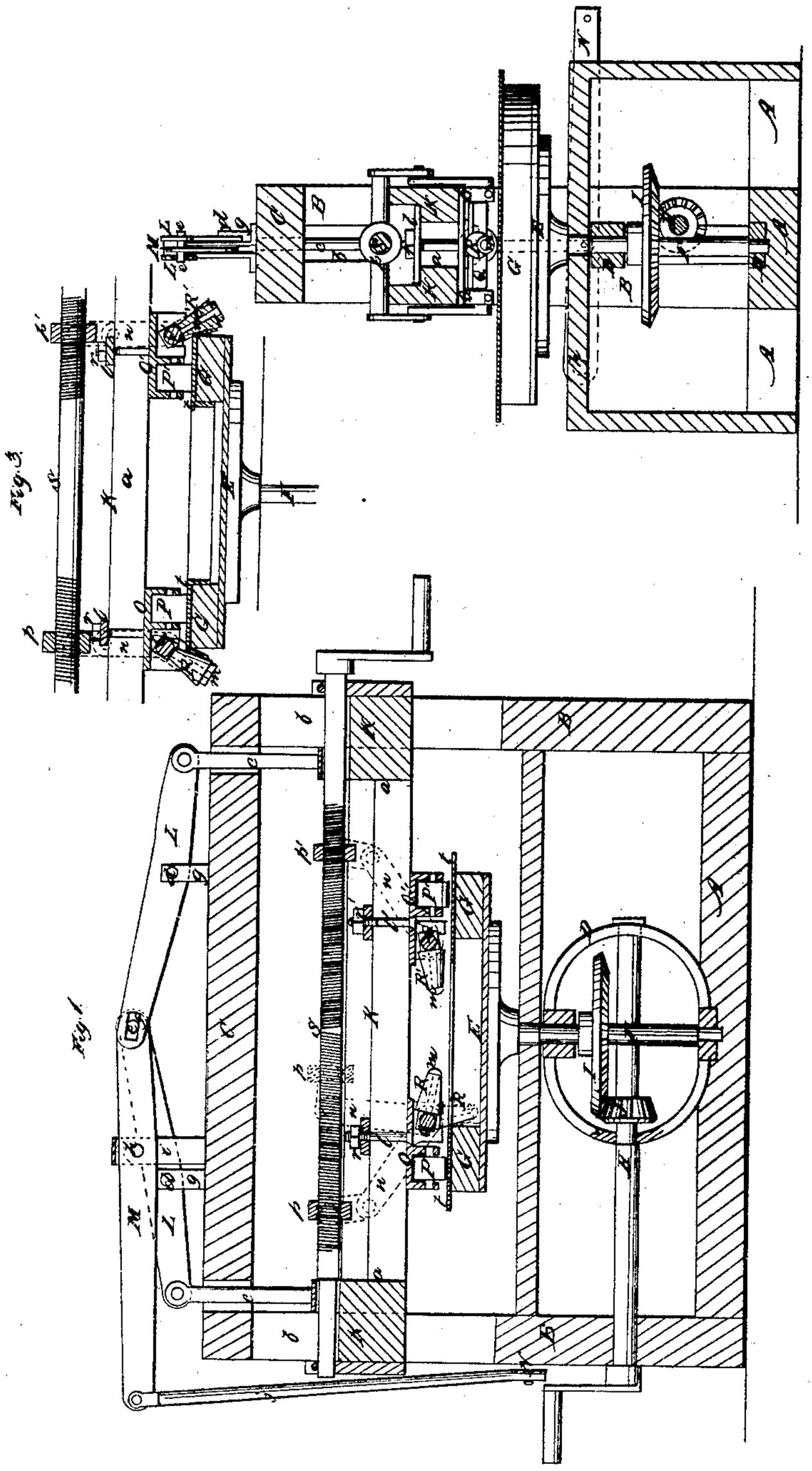
D. HOWELL.

MACHINE FOR BENDING METAL PLATES.

No. 19,090. Patented Jan. 12, 1858.



UNITED STATES PATENT OFFICE.

DAVID HOWELL, OF LOUISVILLE, KENTUCKY.

IMPROVED MACHINE FOR BENDING METAL PLATES.

Specification forming part of Letters Patent No. **19,090,** dated January 12, 1858.

To all whom it may concern:

Be it known that I, DAVID HOWELL, of Louisville, in the county of Jefferson and State of Kentucky, have invented a new and useful Improvement in Machinery for Bending Flanges on Boiler-Heads, Flue-Rings, and other Circular Metal Plates; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1 and 2 are vertical sections at right angles to each other of a machine constructed according to my invention for bending flanges round the inner edges of annular plates. Fig. 3 is a view exhibiting a modification of part of the machine adapted to the bending of flanges round the outer circumference of circular plates.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in the use of a series of rollers applied and operated in combination with a rotating circular bed or anvil, in the manner hereinafter described, for the purpose of turning or bending flanges around circular plates of metal.

To enable others to make and use my invention, I will proceed to describe its construction and operation.

A B B C D is the framing of the machine, which may be of iron or wood, or both combined.

E is a circular horizontal table secured to an upright shaft F, which is fitted to rotate in bearings in the central portion D of the framing, said table E having secured to its upper surface the annularly-shaped bed or anvil G, upon which the plates are placed to have the flanges formed. The external circumference of this anvil G corresponds with the intended circumference of the interior of a flange to be bent round the outer edge of a circular plate and its interior circumference with the circumference of the exterior of a flange to be turned round the inner edge of an annular plate.

H is a horizontal shaft fitted to suitable bearings in the part D, and in one of the side posts B B of the framing and geared by a pair of bevel-gears I J with the shaft F. This shaft H, when rotary motion is given to it by any suitable agency, communicates rotary motion through the bevel-gearing to the shaft F and to the anvil.

K is a strong horizontal beam of cast-iron or timber, having a vertical slot *a* extending the greater part of its length and having tenons at its ends, which are fitted into upright slots *b b* in the side posts B B of the framing. This beam, which serves to carry the bending-rollers, is suspended over the center of the table E and bed or anvil G by two rods *c c*, near its ends from two similar levers L L, which work on fulcrum-pins *d d*, supported in two small posts *g g* on the top of the framing, and the two levers are connected by a pin-and-slot connection *e f* with a longer lever M, which works on a fulcrum-pin *h*, supported in a post *i* on the top of the framing. The lever M is connected by a rod *j* with a lever N, working on a fulcrum-pin *k* at the lower part of one end of the framing. The above series of levers and connections serve to raise and lower the beam K, and the connection of the levers L L is such as to keep the beam K horizontal in all its changes of position.

O O′ are two castings secured to the beam K by bolts *l l′*, passing through the slot *a* and plates *q q* and nuts *r r* above the said slot. These castings contain the bearings for the journals of two rollers P P′, whose duty it is to bear upon the plate to be bent at diametrically-opposite points and confine it upon the bed or anvil G during the operation of bending the flange or flanges. The same castings contain bearings which receive the journals of two shafts Q Q′, to which the flange-bending rollers are attached.

I will first describe the arrangement of the rollers for bending inside flanges on annular plates, as represented in Figs. 1 and 2. The rollers R R′ for this purpose are fitted to turn freely on arms *m m′*, secured to the shafts Q Q′. Only two rollers are necessary—viz., one attached to each shaft. The shafts Q Q′ have each attached to it a pair of lever-arms *n n′*, and the said shafts and arms *m m′* and *n n′* taken together may be considered as swinging frames carrying the rollers R R′. The arms *n n′* connect by short links *o o* with one of two nuts *p p′*, which are fitted one to a left-hand screw-thread and the other to a right-hand screw-thread on a horizontal shaft

S, which is fitted to turn in bearings at the ends of the beam K. The arrangement of rollers for bending outside flanges is substantially the same as that above described; but instead of their being placed on the inner side of the rollers P P′, as shown in Fig. 1, they are placed on the outer side, and instead of a single roller on each shaft Q or Q′, two or more may be used, the shaft and arms *n n′* and *m m′* being combined to form strong frames for the rollers. The same castings O O′ serve for either arrangement of the bending-rollers; but their position requires to be reversed to suit the two arrangements of rollers, as will be readily understood by reference to Figs. 1 and 3.

The operation of bending the inside flanges is as follows: The beam K is first raised by raising the lever N, and the castings O O′, carrying the rollers P P′ and R R′, are adjusted and secured to the beam at proper and equal distances from the center of the table F, the rollers R R′ at this time occupying a horizontal position, as shown in black outline in Fig. 1. The annular plate of metal *t t* to be bent is then laid upon the bed or anvil G in a position concentric thereto, and the beam R lowered by depressing the lever N, which is to be then weighted to cause the rollers P P′ to press heavily upon the plate *t* and confine it to the bed or anvil, after which rotary motion is communicated to the shaft H and through it to the bed or anvil and to the plate *t*. The screw-shaft S is then turned in a direction to cause the nuts *p p′* to move toward each other slowly, and this movement of the nuts communicates to the frames Q *m n* and Q′ *m′ n′* a motion which moves rollers R R′ gradually downward toward a vertical position, thus causing them to bear upon the margin of the plate *t t*, and gradually to bend it downward all round as it revolves in contact with them, till it is formed into a flange standing at a right angle or any other desired angle to the surrounding portion of the plate. The change of position of one of the roller-frames and its roller R, when the flange is formed or its formation nearly completed, is illustrated in red outline toward the left-hand side of Fig. 1. When the flange has been thus formed, the rotation of the shaft H may be discontinued and the weight removed from the lever N and the said lever raised to lift up the beam K, and the rollers R R′ drawn back to their first-described horizontal position by turning back the screw-shaft S, and the plate may be removed from the machine; or, if it be desired to turn a flange on the outside edge of the plate also, the castings Q Q′ may be turned round and adjusted at the proper distance from the center of the bed or anvil, as shown in Fig. 3, and other roller-frames and rollers R R′ put in, (though the same may be used,) and when this has been done the beam K is brought down again, the lever N, loaded as before, the shaft H set in motion again, and the shaft S turned in a direction to move the rollers R R′ gradually from the horizontal position they occupy at the commencement of the operation downward toward a vertical position, by which movement of the rollers, acting in combination with the rotary motion of the plate, the margin of the plate is turned over to form the external flange. An external flange, it is obvious, may be formed in the same manner when no internal flange is required.

In some cases two sets of rollers may be employed in the same machine, acting in the same manner as those described, one set to turn inside and the other to turn outside flanges, and in that case suitable provision may be made for disconnecting either one set from the screw S while the other is in use.

What I claim as my invention, and desire to secure by Letters Patent, is—

The use of a pair or series of rollers R R′, fitted to swinging frames of lever-like character, which are attached in an adjustable manner to a beam R or its equivalent, and operated by a double screw S or its equivalent, substantially as described, in combination with a rotating circular or annular bed or anvil, for the purpose set forth.

DAVID HOWELL.

Witnesses:

A. W. WALLER,

WM. ATKINSON.