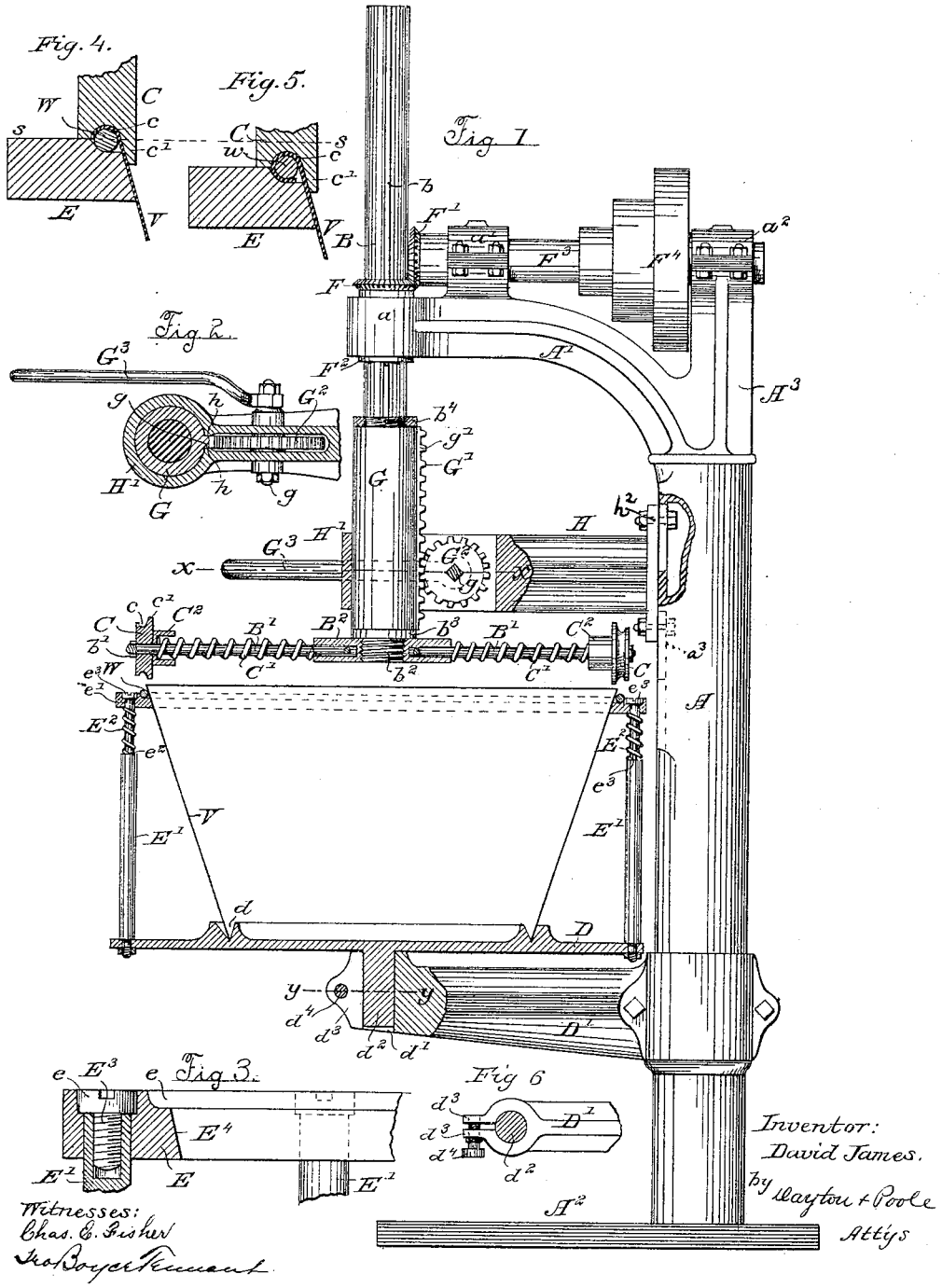
(No Model.)

D. JAMES.

MACHINE FOR WIRING THE EDGES OF SHEET METAL VESSELS.

No. 348,396. Patented Aug. 31, 1886.



UNITED STATES PATENT OFFICE.

DAVID JAMES, OF JEFFERSON, ILLINOIS.

MACHINE FOR WIRING THE EDGES OF SHEET-METAL VESSELS.

SPECIFICATION forming part of Letters Patent No. 348,396, dated August 31, 1886.

Application filed May 22, 1886. Serial No. 202,959. (No model.)

To all whom it may concern:

Be it known that I, DAVID JAMES, of Jefferson, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Bending and Wiring the Edges of Sheet-Metal Vessels; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of machines employed for bending the edges of tubular sheet-metal vessels, either for forming a rim or bead thereon or for turning or folding the edge or marginal part of the vessel-body over a strengthening-wire placed about the rim of the vessel.

The object of the invention is to provide a cheap and simple apparatus, which may be easily operated by unskilled workmen, and one whereby the metal may be bent automatically and at one operation.

To these and other ends, as will hereinafter appear, the invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a side elevation, with the principal operative parts in central vertical section, of a machine or apparatus embodying my invention. Fig. 2 is a detail sectional view taken upon line *x x* of Fig. 1. Fig. 3 is an enlarged detail section of an annular ring or die. (Shown in Fig. 1.) Figs. 4 and 5 are diagrams illustrating the operation of folding the sheet metal about the wire. Fig. 6 is a detail section taken upon line *y y* of Fig. 1.

As illustrated in said drawings, A indicates a vertical post or standard forming the main part of the frame of the machine, said standard being provided with a horizontal arm, A′, at its top, and with a suitable base, A^2.

B indicates a vertical shaft or spindle, which is sustained in a bearing, *a*, upon the arm A′ of the frame, and is constructed to both rotate and slide freely longitudinally in said bearing, said spindle being provided at its lower end with one or more radial arms, B′, upon the outer ends of which are mounted freely-rotating die-rollers C C, provided with circumferential grooves *c c*, and constructed to turn about axes of rotation which are radial with reference to the shaft or spindle B.

D is a support for sustaining the body of the vessel to be operated upon, said support being herein shown in the form of a flat plate, which is provided with an annular groove, *d*, adapted to receive the lower edge of an open-bottomed cylindric or conical vessel-body. Said plate is illustrated in the drawings as being sustained from the post A by means of an arm, D′, secured to the post, and provided at its outer end with an aperture, *d′*, adapted to receive a central depending pin, d^2, upon the support D, means being preferably provided for holding the support immovable upon the arm by splitting the end of the said arm vertically into the aperture *d′*, and providing the arm at both sides of the split or opening with lugs d^3, through which are inserted binding-screws d^4, for clamping the side walls of the aperture upon the pin d^2.

E is an annular die-ring for sustaining the marginal part of the vessel-body and the wire during the operation of the die-rollers C thereon. The said die-ring E is provided at the inner margin of its top surface with an annular recess or rabbet, *e*, to receive the wire W, which is to be secured to the vessel-body by the machine, and is sustained upon the machine-frame by supports constructed to permit the said ring to yield vertically downward, or in a direction parallel with the axis of the cylindric or conical vessel-body, under the downward pressure of the die-rollers thereon, in a manner and for a purpose which will hereinafter fully appear. The particular means for supporting said die-ring herein shown consist of posts E′, fixed at their lower ends in the support D, and engaging suitable guide-apertures, *e′*, in the ring E, spiral springs E^2 being placed about the upper part of the post, between the lower surface of the ring and shoulders e^2 upon the posts, for holding the ring normally in an elevated position. The upward movement of the said ring under the action of the said springs E^2 is limited by suitable stops or laterally-projecting heads formed upon the upper ends of the posts E′. Said stops, as herein shown, are formed by the heads e^3 of screws E^3, which are inserted in suitable apertures in the tops of the posts, the heads of the screws being desirably coun-

tersunk into the die-ring so as to come flush with the upper surface of the latter. In the particular machine shown the die-ring E and support D are adapted for receiving and holding a conical vessel-body, and for this purpose the said ring E is provided with a conical inner bearing-surface, E^4, which rests in contact with and supports the vessel-body near its upper margin. For operating upon a vessel-body of other shape than that shown—as, for instance, a cylindric one—the shape of the said surface E^4 will of course be made to correspond with the shape of the vessel. The die-rollers C are constructed in the particular machine not only to rotate but to slide longitudinally upon the arms B′, attached to the revolving shaft B, and are held by means of spiral springs C′, suitably applied for the purpose, in contact with the heads or nuts b' upon the ends of said arms, in such position that the grooves c of said die-rollers are vertically above the wire W when the latter is in place in the groove e of the die-ring.

In the particular construction of the parts herein shown the arms B′ consist of cylindric rods secured at their inner ends in a metal plate or hub, B^2, connected with the lower end of the shaft or spindle B by engagement with a screw-threaded nipple, b^2, thereon. The outer portions of said hub B^2 form a shoulder, between which and the die-rollers the springs c' are placed, the outer ends of the springs being preferably held in cup-shaped washers C^2, arranged to bear against the inner faces of the said die-rollers. Rotary motion is given to the shaft B, in the particular construction shown, by means of a beveled gear, F, which is attached to a sleeve, F^2, sustained in the bearing a, surrounding the shaft B, and provided with a spline or feather engaging a longitudinal groove, b, in said shaft. Said gear F is actuated by engagement with a gear, F′, which is attached to a horizontal shaft, F^3, provided with a cone-pulley, F^4, by which rotary motion may be transmitted to the shaft through the medium of a suitable driving-belt. Said shaft F^3 is, as herein shown, mounted at one end in a bearing, a', upon the arm A′ of the frame, and is sustained at its opposite end in a bearing, a^2, attached to an upward prolongation, A^3, of the frame-standard A.

The shaft B, together with the arms B′ and die-rollers C carried thereby, is made vertically movable, as above described, for the purpose of enabling said rollers to be brought down upon the margin of the vessel-body and the wire, and any suitable device connected with the shaft B and adapted to permit a free rotary movement of said shaft may be employed for effecting a vertical movement of the several parts, when desired. A simple and convenient construction for this purpose is herein illustrated, and is as follows: Upon said shaft B is placed a sleeve, G, Figs. 1 and 2, which is adapted for the free rotation of the shaft therein, and is held from endwise movement upon the shaft by means of shoulders or collars b^3 b^4, formed or secured upon the said shaft at the lower and upper ends of the sleeve, as shown. Upon the said sleeve G is formed a longitudinal rack-bar, G′, adapted for engagement with the pinion G^2, mounted upon a horizontal shaft, g, having bearings in an arm, H, which is secured to the frame-standard A, the end part, H′, of said arm H being adapted to fit closely about and to form a bearing for the sleeve G, so as to hold and guide the sleeve in its vertical movement and prevent lateral movement or vibration of the lower end of the shaft B and the parts connected therewith. Any rotary movement of the said sleeve G with the shaft is prevented, in the construction shown, by the engagement of narrow vertical bearing-surfaces h of the arm H with the lateral faces g' of the toothed rack G′.

Any suitable means may be employed for actuating the pinion G^2 for the purpose of raising and lowering the shaft B, as above set forth, the means herein shown consisting of a hand-lever, G^3, attached to the shaft g of the pinion G^2, whereby the said pinion may be turned and the shaft raised and lowered, as above set forth.

In the operation of a device constructed as above set forth the wire is first placed in the rabbet of the die-ring E, and the open-ended tubular vessel-body (indicated by V) is then placed within said ring, with its lower edge resting upon the support D. The parts being placed in the position described and as shown in the drawings, Fig. 1, the shaft B, the arms B′, and the die-rollers thereon are rapidly rotated by power transmitted through the shaft F^3, and are at the same time moved downwardly by turning the pinion G^2 until the die-rollers come in contact with the upper edge or marginal part of the vessel-body, which is arranged to extend slightly above the wire held in the rabbet of the die-ring. The action of the die-rollers when pressed downwardly upon the edge of the metal is to bend the latter down upon the wire, the groove c of each die-roller being semicircular in cross-sectional shape and of approximately the same width or slightly wider than the diameter of the wire. After the projecting edge of the metal has been bent down in contact with the wire, as above described, the downward vertical movement of the die-rollers is continued so as to further press the metal downward, with the effect of bending the metal closely about the wire, and of depressing or thrusting downwardly the die-ring as the die-rollers descend or are carried toward it. This downward movement or vertical pressure of the die-rollers upon the marginal part of the vessel or wire is continued until the sheet metal has been bent or carried around the wire a sufficient distance for properly holding it in place.

The operation of the die-rollers upon the metal edge of the vessel-body is more clearly indicated in the diagram, Figs. 4 and 5, in which Fig. 4 illustrates the position of the

parts when the edge of the sheet metal has been turned half-way about the wire, and Fig. 5 when it has been carried completely around the wire, the dotted lines *s s* extending across the said figures serving to illustrate the relative vertical position of the ring and die-rollers when the metal has been carried partially and entirely around the wire.

The bending of the edge of the sheet metal over the upper part of the wire is obviously effected entirely by the action of the die-rollers; but the further bending of the said sheet metal after its edge has reached the die-ring is obviously aided by the action of the rabbet *e*, which tends to deflect or bend the edge of the sheet inwardly as it is carried or forced around the wire by the downward pressure of the die-rollers thereon.

The die-rollers C are made to slide longitudinally upon their bearings, as above described, in the case of machines adapted for wiring a vessel having a conical body, in order that said rollers may move inwardly or toward the shaft, as said rollers are carried downwardly for turning or folding the edge of the sheet metal against and about the wire. The construction embracing springs C′ adapted to hold the said die-rollers at the outward limit of their movement is obviously desirable, in order that the die-rollers may, when they first strike the edge of the metal, be held in position to exert an outward pressure upon the edge, it being obvious that if the rollers were entirely free to move inwardly the edge of the metal would be first acted upon by the middle part, and not by the inner rounded wall of the groove *c*. Said springs also operate to hold the rollers normally in position to engage the top of the vessel, and to automatically return said rollers into position for engagement with the edge of another vessel after each vessel has been operated upon. The marginal parts of the said die-rollers at the inner side of the groove *c* therein are desirably extended to form flanges *c′*, which are, as herein shown, and preferably, constructed conical in shape, and inclined to correspond with the taper or slope of the vessel-wall, as more clearly shown in Figs. 4 and 5, said flanges *c′*, by their engagement with the inner surface of the vessel-wall, obviously serving to hold the die-rollers accurately in position for operating upon the marginal part of the vessel, as the said rollers are forced toward the latter. It will be understood, however, that in the case of a machine adapted for wiring cylindric vessels only there will be no inward movement of the die-rollers upon their supports, and in such machine any provision for a bodily radial movement of the said die-rollers may be absent, and the flanges *c′* may be omitted.

To enable the finished vessel to be removed from the die-ring and support and another vessel inserted, the arm D′ is made to swing or rotate upon the frame-standard A, whereby the die-ring and support may be swung laterally from beneath the spindle B and die-rollers.

In order to allow the die-rollers C to be moved a greater or less distance downwardly, as may be necessary in operating upon larger or smaller vessels, the arm A′, in which the sleeve G slides, is desirably adjustably connected with the standard A, the connecting devices herein shown consisting of bolts h^2, engaged with vertical slots a^3 in the said standard A, as clearly shown in Fig. 1.

In operating upon a conical vessel the wire will be placed in the machine, with its ends disconnected and somewhat separated, so that said wire may become reduced in diameter, or contracted as the wire is moved bodily downward under the action of the die-rollers thereon. It is usually preferred, in the manufacture of sheet-metal open-topped vessels—such as pans or cups—which are wired about their open ends—to do the wiring before the bottom of the vessel is inserted, and the support D is therefore herein shown as provided with the groove *d*, adapted to receive and sustain a tubular and open-ended or bottomless vessel-body. The said support may obviously, however, if so desired, be adapted to sustain a vessel provided with a bottom, the support D in any case being made of proper shape to receive and hold the bottom part of the vessel.

A principal advantage of the construction described and shown wherein the die-ring E is attached to the support D, and the latter is detachably connected with the machine-frame, is, that the parts mentioned, when thus made, may be easily and conveniently removed from the machine and replaced by another die-ring and support adapted for a vessel of other form or size. It is to be understood, however, that my invention, as herein broadly claimed, is not limited to the feature of construction last referred to; but inasmuch as particular advantages are gained thereby, as above stated, said construction is made the subject of specific claims herein.

A main feature of novelty present in the machine above described is embraced in a construction comprising a die-ring adapted to sustain the wire, and one or more die-rollers arranged in opposition to the ring, constructed to roll upon the edge of the vessel and wire, and, as far as the operation of these parts is concerned, either the rollers or the ring may be made bodily movable toward and from the other part, and either the rollers or the ring may be made to revolve. My invention, as herein broadly claimed, therefore covers the said die-rollers and die-ring constructed for mutual operation, in the manner described, either when said rollers are made bodily movable, as herein shown, or when the parts are otherwise given the required relative movement. It is to be understood, furthermore, that the particular means illustrated for actuating the bodily movable and rotative parts of the machine is only one of a number of fa-

miliar devices which may be employed for the same purpose; and my invention, as herein broadly claimed, is not therefore limited to any particular device or devices for giving motion to said parts.

As far as the operation of the die-ring is concerned, it is not essential that the said ring should be provided with a rabbet, *e*, as herein shown, inasmuch as the principal function of said ring is to afford support for the wire in opposition to the pressure of the rollers, it being found in practice that the rollers will bend or curl the sheet metal about the wire whether the rabbet is present or not. The use of said rabbet is preferred, however, inasmuch as said rabbet aids to some extent in bending the metal inwardly, as above stated, and said rabbet also serves to prevent the wire spreading or springing away from the edge of the vessel when said edge is bent outwardly against it in the beginning of the operation of the rollers thereon, as is liable to occur when the ends of the wire are disconnected and free to spread apart.

I claim as my invention—

1. A machine for wiring sheet-metal vessels, comprising a support for the vessel-body, a yielding die-ring, and one or more die-rollers acting in opposition to the die-ring, said vessel-support and die roller or rollers having a bodily movement toward and from each other, and the die-ring being constructed to yield toward the vessel-support, substantially as described.

2. A machine for wiring sheet-metal vessels, as described, a support for the vessel-body, a die-ring yieldingly supported upon the vessel-support, and a frame carrying one or more die-rollers constructed to act upon the vessel by a bodily and rotative motion of one of said parts, substantially as described.

3. The combination, with the machine-frame, of a vessel-support, a yielding die-ring, one or more die-rollers, a frame sustaining said die-rollers having longitudinally-sliding and rotative connection with the frame, and means applied to said frame for rotating and moving longitudinally the latter, substantially as described.

4. The combination, with the machine-frame, of a vessel-support, D, detachably connected therewith, a yielding die-ring sustained upon the said support, and a revolving and bodily-movable frame carrying one or more die-rollers acting in opposition to the die-ring, substantially as described.

5. The combination, with a vessel-support, of a yielding die-ring and a frame carrying one or more radially-movable die-rollers acting in opposition to the die-ring, said frame and vessel-support being movable bodily toward and from each other, and said die-ring being constructed to yield toward the vessel-support in the advance movement of the die-rollers, substantially as described.

6. The combination, with a vessel-support and a yielding die-ring, of a revolving frame carrying one or more radially-movable die-rollers operating in opposition to the die-ring, said frame and the vessel-support being movable bodily toward and from each other, and a spring or springs applied to throw the die-rollers outwardly, said die-ring being constructed to yield toward the die-support in the advance movement of the die-rollers toward the said die-ring, substantially as described.

7. The combination, with a vessel-support and a yielding die-ring, of a grooved die-roller acting in opposition to the die-ring, said roller being movable radially toward and from the central axis of the ring, and provided with a marginal flange, *c'*, at one side of the groove therein, and a spring applied to hold the die-roller at the outward limit of its movement, said die-roller and vessel-support being movable toward and from each other, and the die-ring being constructed to yield toward the vessel-support in the advance movement of the die-roller, substantially as described.

8. The combination, with the machine-frame, the vessel-support D, and the yielding die-ring E, of the die-rollers C and vertically-movable and rotative frame for said rollers, comprising a shaft, B, provided with radial arms B', affording bearings for the said die-rollers at their outer ends, and a spiral spring, C', applied to the said arms for holding the die-rollers at the outward limit of their movement, substantially as described.

9. A machine for wiring sheet-metal vessels, comprising a die-ring, E, provided with an annular recess or rabbet, *e*, for the wire, and one or more die-rollers operating in opposition to the said die-ring, substantially as described.

10. The combination, with the machine-frame and a revolving and vertically-movable die-roller, of a vessel-support attached to the frame, a die-ring, E, and springs interposed between the said support and the ring, constructed to sustain the said ring at the upward limit of its movement, substantially as described.

11. The combination, with the machine-frame and the revolving die-rollers C and the die-ring E, of a support, D, for the vessel-body, provided with an annular groove, *d*, for the lower margin of the vessel-body, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

DAVID JAMES.

Witnesses:
C. CLARENCE POOLE,
CHAS. E. FISHER.