Oct. 30, 1923. 1,472,543

A. W. BEERE

WIRE BENDING MACHINE

Filed Oct. 7, 1922 2 Sheets-Sheet 1

FIG. 1.

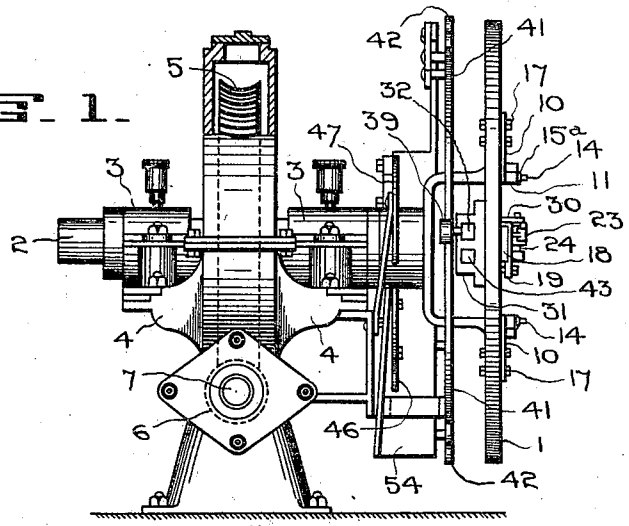
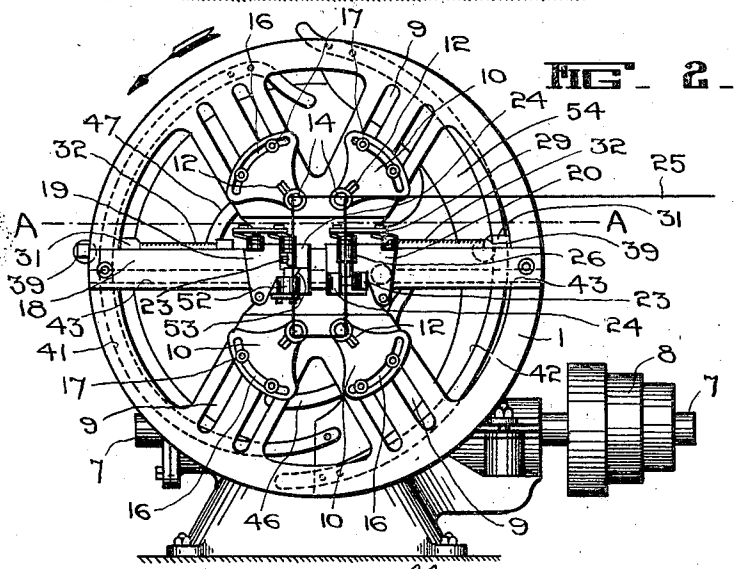


FIG. 2.



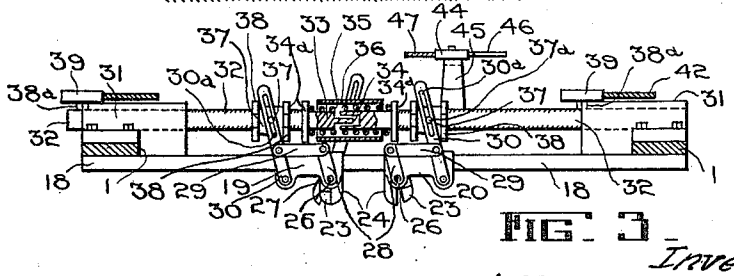


FIG. 3.

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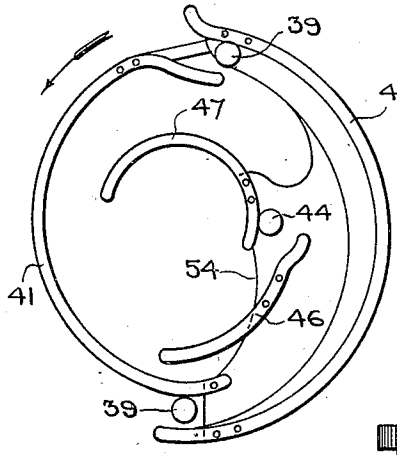


FIG. 4.

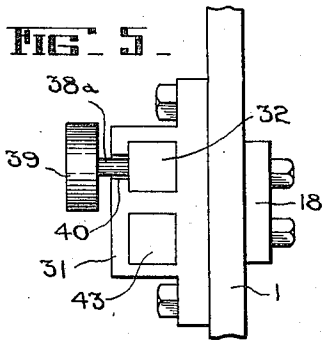


FIG. 5.

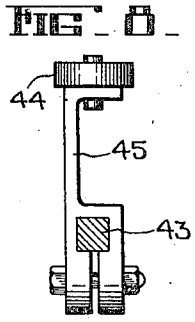


FIG. 8.

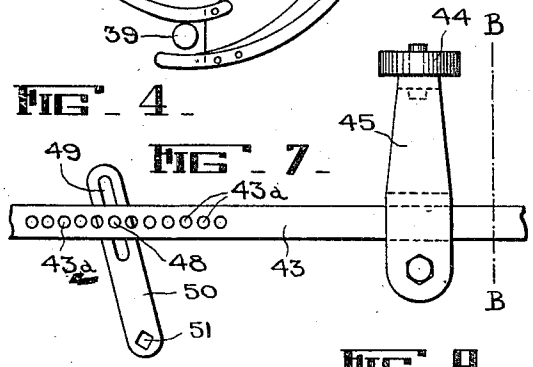


FIG. 7.

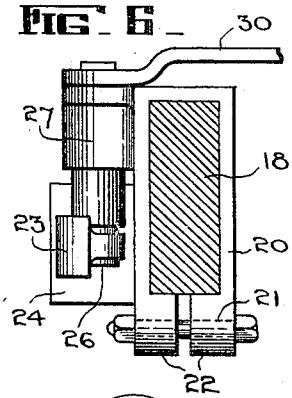


FIG. 6.

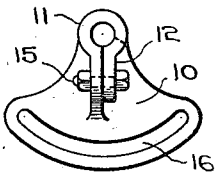


FIG. 9.

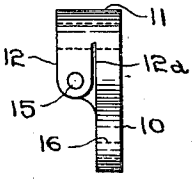


FIG. 10.

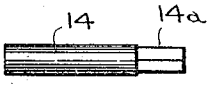


FIG. 11.

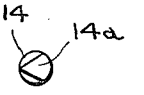


FIG. 12.

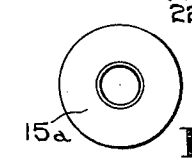


FIG. 13.

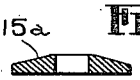


FIG. 14.

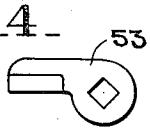


FIG. 15.

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Patented Oct. 30, 1923. 1,472,543

UNITED STATES PATENT OFFICE.

ARTHUR WYNDHAM BEERE, OF AUCKLAND, NEW ZEALAND, ASSIGNOR TO ANGLE BRACE COLLAPSIBLE BOX COMPANY, LIMITED, OF AUCKLAND, NEW ZEALAND.

WIRE-BENDING MACHINE.

Application filed October 7, 1922. Serial No. 593,012.

To all whom it may concern:

Be it known that ARTHUR WYNDHAM BEERE, a citizen of Dominion of New Zealand, residing at 8 Prospect Place, Auckland, in the Provincial District of Auckland, has invented certain new and useful Improvements in Wire-Bending Machines, of which the following is a specification.

This invention relates to means employed for producing from lengths of wire or other similar material, forms of varying shapes.

The object of the invention is to provide a machine especially adapted to produce from lengths of wire, hoop iron, or similar material rectangular or other formations having a number of flat sides.

The improved machine, comprises a rotary face plate provided with a number of projections or formers and gripping jaws, the latter being designed and actuated to grip the wire or the like which is led to the face plate under tension, so that the rotary movement of the face plate, causes the wire or the like to be bent or shaped around the projections or formers and so produce formations of the shape desired.

Provision is also made by means of a cutter mounted on the face plate, for severing the completed formations, from the length of wire or the like led to the face plate, said cutter and the gripping jaws being operated by the action of rollers in running against stationary curved or cam members, as the face plate rotates.

The projections or formers, the gripping jaws, and the cutter are adjustably mounted on the face plate in order that formations of the desired size and shape can be produced.

Any suitable driving mechanism can be employed for rotating the face plate, while the wire or other material from which the formations are to be produced, is kept under tension by being passed around retarding means, such as a brake drum.

The machine and its operation will however be more particularly described in conjunction with the accompanying drawings, in which:—

Figure 1 is a side elevation of the machine and

Figure 2 a front view thereof.

Figure 3 is an enlarged part sectional plan taken on the line A—A, Figure 2.

Figure 4 is a front view showing the arrangement of the stationary members having the curved and cam surfaces against which the rollers responsible for the operation of the gripping jaws and the cutter work.

Figure 5 is an end view enlarged of one of the guides in which are held bars transmitting movement from the aforesaid rollers to the gripping jaws and the cutter.

Figure 6 is an end view enlarged showing the manner of mounting on the face plate one of the fittings which carry the gripping jaws and the cutter.

Figure 7 is a part detail view in plan of the cutter operating means.

Figure 8 is a cross sectional view on the line B—B, Figure 7.

Figures 9 and 10 are an elevation and side view respectively of one of the quadrants attachable to the face plate for holding the projections or formers around which the wire or the like is bent.

Figures 11 and 12 are an elevation and an end view respectively of one of the projections or formers around which the wire is bent.

Figures 13 and 14 are an elevation and a cross sectional view respectively of a tapered washer, for fitting on the wire bending projections or formers.

Figure 15 illustrates in plan the cutter.

The face plate 1 is keyed on a shaft 2 mounted in bearings 3, supported by a frame 4, said shaft being driven through any suitable gear such as a worm wheel 5, actuated by a worm 6 on a shaft 7, the latter having mounted thereon a stepped pulley 8 whereby different speeds can be obtained.

The face plate 1 contains a number of radial slots 9 arranged in pairs, each pair of slots 9, facilitating the adjustment on the plate 1 of a quadrant 10 (Figures 1, 2, 9 and 10).

The quadrants 10 are formed with bosses 11 the inner side of each of which is cut at right angles to the quadrant and is provided with a pair of lugs 12. One of said lugs 12 is cut where it joins the quadrant as at 12^a (Figure 10) said cut extending into the boss 11, the result of which is that the latter is enabled to be clamped by means of a bolt 15 passing through the lugs 12 tightly around a projection or former 14 on the

shank of the latter being inserted in the boss 11.

Each projection or former 14 has its outer end 14ª made flat sided in order to produce a well defined corner around which wire or the like can be bent (Figures 11 and 12).

When inserted in the bosses 11, the shanks of the projections or formers 14 project sufficiently to enable cone shaped washers 15 to be placed thereon, the bases of said washers being presented to the bosses 11 (Figures 1, 2, 13 and 14.)

The quadrants 10 contain radical slots 16 struck from the centres of the bosses 11 and are adapted to be secured to the face plate 1 by means of bolts 17 passed through the slots 9 and 16. By these means the quadrants 10 are enabled to be adjusted to bring the projections or formers 14 to any position on the face plate 1, within the limits of the slots 9 and 16 and so enable formations of the desired shape to be produced on bending wire or the like around said projections or formers 14.

Secured across the face plate 1 is a bar 18, and slidable on the latter are fittings 19, 20, each of which is capable of being clamped in any position on said bar, by a bolt 21 passing through lugs 22 (Figure 6).

These fittings each carry a pair of gripping jaws 23, 24 while the fitting 19 also carries the cutter 53.

Of the jaws 23, 24 the jaw 24 is in each case a fixture while the jaw 23 in each case is keyed on one end of a small shaft 26 which passes through a boss 27 and has keyed on its other end one end of a lever 28 (Figure 3) the other end of which is connected by a rod 29 with a lever 30 fulcrummed at one end either to the fitting 19 or 20, and slotted at the other end as at 30ª.

Behind the bar 18 and in direct alignment with each other and also slidable in guides 31 secured to the rear of the face plate 1 are rods 32, one of which has its inner end formed with a projection 33 to enter a recess 34 in the other of said rods for the purpose of preserving their alignment (Figure 3).

On each rod 32 near its inner end is fixed a collar 34ª while between said collars and surrounding the meeting ends of said rods 32, a compression spring 35 is placed. A sleeve 36 is placed over said spring 35 for the purpose of further preserving the alignment of the rods 32.

The rods 32 are flat sided with a screw thread formed on the corners, and each rod has slidable thereon a fitting 37 from which a pin 37ª projects and enters the slot 30ª of one of the levers 30. The fittings 37 are held against sliding movement on the rods 32 by nuts 38 screwing thereon, while the flat sides of said rods 32 prevent the fittings 37 from turning.

Near its outer end each rod 32 has projecting therefrom a pin 38ª said pin carrying a roller 39 and passing through a slot 40 in a guide 31 (Figure 5) whereby end movement of the rods 32 is not interfered with.

The moving jaws 23 are mounted so that when one jaw 23 is closed against its fellow jaw 24 the other jaw 23 is moved away from its fellow jaw 24.

The rollers 39 on the face plate 1 being rotated in the direction indicated run around the outside of the stationary curved guide 41, and against the inner side of the fixed cam member 42 as indicated in Figure 4.

Also mounted behind the bar 18 and operating below the rods 32 and also in the guides 31 is a sliding bar 43 (Figures 1, 2, 5, 7 and 8) designed to be given end movement by means of a roller 44 mounted on the fitting 45 clamped on said bar (Figures 7 and 8) running upwards against the inner edge of the stationary cam member 46 and over and downwards on the stationary cam member 47.

The bar 43 has projecting therefrom a pin 48 (Figure 7) which is entered in a slot 49 in the outer end of a lever 50 the inner end of which is keyed on one end of the shaft 51 which passes through a boss 52 on the fitting 19, and has keyed on its other end the cutter 53, the latter operating in conjunction with the fixed jaw 24 on the fitting 19.

The bar 43 is provided with a series of holes 43ª to enable the connection between the bar 43 and lever 50 to be established at different points, which is rendered necessary when the fittings 19, 20 are adjusted on the bar 18 to accommodate the jaws 23, 24 and cutter 53 to the shape and size of the formation being produced around the projections or formers 14.

The curved guide 41, and cam members 42, 46 and 47 are supported from a casting or member 54 secured to the frame of the machine.

In practice the wire, hoop iron or the like 25 from which the formations are to be produced is coiled on a rotary spool, and after being passed one or more times around a brake drum or other apparatus which will maintain a tension on the wire or the like is led to one of the pairs of gripping jaws 23, 24 preferably those jaws on the fitting 20.

In order that the jaws 23, 24 will be open to receive the wire or the like 25 the face place 1 is rotated so that the jaws in question will be uppermost and so that the roller 39 on the rod 32 relating to the movable jaw 23 of said pair will occupy the position of the uppermost roller 39 shown in Figure 4. In this position the rod 32 carrying the uppermost roller 39 is by the contact of the latter with the inner edge of the

cam member 42 forced inwards or towards the jaw 23 and compresses the spring 35.

After the end of the wire or the like 25 has been placed between the uppermost jaws 23, 24 the face plate 1 is rotated in the direction indicated and as soon as the uppermost roller 39 clears the upper end of the cam member 42, the rod 32 carrying said roller is forced outwards by the expansion of the spring 35, the effect of which is that the wire is gripped between the uppermost movable jaw 23 and its fellow fixed jaw 24.

Continued rotation of the face plate 1 causes the upper-most roller 39 to run outside the curved guide 41, the result of which is to lock said jaws 23, 24 against opening and ensure a positive grip of the wire or the like 25 being maintained.

The wire or the like 25 is then strained and drawn from the brake drum or the like and caused to be bent or shaped around the projections or formers 14, owing to the rotation of the plate 1.

During the time the uppermost roller 39 descends from its highest position to its lowest position, the grip which said roller controls cannot alter owing to the roller running outside the guide 41.

As the roller 39 passes from below or clear of the lower end of the guide 41, it makes contact with the inner edge of the cam member 42 the shape of which forces the roller 39 and the rod 32 on which it is carried inwards, the effect of which is that the grip of the wire or the like 25 controlled by said roller 39 is released, owing to the jaw 23 being forced away from the fixed jaw 24 under the inward movement of the rod 32. The jaws 23, 24 as they ascend are opened and maintained open by the cam member 42 until such time as a fresh grip of the wire or the like 25 is obtained, by the roller 39 clearing the upper end of the cam member 42 as before mentioned.

Descending jaws 23, 24 are kept closed by the guide 41 until such time as the roller 39 relating to such jaw clears the lower end of the guide 41 and commences to move inwards on making contact with the cam member 42.

As one pair of jaws 23, 24 opens and ascends the other pair 23, 24 closes on the wire or the like 25 and descends, to ensure the latter being bent completely around the projections or formers 14.

Once in each revolution of the face plate 1, the cutter 53 is operated to sever the completed formation from the length of wire or the like 25.

This action is brought about as the jaws 23, 24 on the fitting 19 descend by the roller 44 running upwards against the inner edge of the cam member 46, the result of which is that the bar 43 is given end movement and causes the cutter 53 to sever the completed formation from the length of wire or the like 25, in advance of the jaws 23, 24 so as to leave the new end of the wire or the like gripped between said jaws.

The wire or the like 25 is led to the projections or formers 14 so as to bear against the cone shaped washers 15 thereon in order that the oncoming wire will always wind around the projections or formers 14 inside the completed formation and so force the latter off the projections or formers 14 on the formation being completely released by the gripping jaws.

What I do claim and desire to obtain by Letters Patent of the United States of America is:—

1. Means for the purpose set forth, comprising a rotary face plate, spaced projections on the latter around which wire may be wound by the rotation of the plate, wire gripping jaws, a cutter mounted on said face plate, rollers operatively connected to said jaws and cutter, and stationary guides and cam members engaged by said rollers as said plate rotates.

2. Means as claimed in claim 1 in which the gripping jaws are arranged in pairs, one jaw of each pair being fixed and the other jaw being movable, levers and connecting rods connected to said movable jaws, and rods connected to certain of said levers and carrying said rollers.

3. Means as claimed in claim 1 in which the projections are adjustable toward and from each other.

4. Means as claimed in claim 1 including quadrants connected to said projections and containing slots, said face plate being also provided with slots, and bolts passing through the slots of the quadrants and the face plate for adjustably securing the quadrants in place.

5. Means as claimed in claim 1 in which the outer ends of the projections are flattened to produce well defined corners, cone-shaped washers arranged on said projections, split bosses grasping said projections and quadrant carrying the bosses and mounted on said face plate.

6. Means as claimed in claim 1 in which the cutter is operatively connected to a lever, which is in turn operatively connected to the roller that engages certain of said stationary guides and cam members.

7. Means as claimed in claim 1 including rods carrying certain of said rollers and arranged end to end and in alignment with each other, a spring for normally holding said rods apart, and means connecting certain of said jaws with said rods.

8. Means for the purpose set forth including a rotatable face plate, a pivoted cutter associated with the face plate, an axially

movable rod connected to the cutter, and slidable in a plane parallel to the plane of rotation of the face plate, a roller on said rod, and fixed cams arranged to engage said roller for reciprocating said rod.

9. Means as claimed in claim 1 in which the stationary guides and cams are arranged in pairs, each pair including an inner and an outer guide, the contact of a roller with the outer edge of the inner guide being adapted to maintain the jaws closed and the contact of said roller with the inner edge of the other guide of the pair being adapted to maintain the jaws in open position.

10. Means as claimed in claim 1 in which the gripping jaws are arranged in an adjustable manner on a bar carried by the face plate, said gripping jaws being slidable along said bar.

11. Means as claimed in claim 1 in which the gripping jaws are provided with operative levers, a bar carried by the face plate and angular in cross section, the edges of the bar being threaded, fittings slidably mounted on said bar and engaging said levers, and nuts engaging the threads of the bar for adjusting said fittings.

12. Means as claimed in claim 1 in which the cutter is provided with an operating slotted lever, a slidable bar carrying the cutter operating roller and having a series of apertures, and a bolt adapted to engage either of said apertures and passing through the slot in said lever.

13. Means as claimed in claim 1 in which the jaws are provided with slotted operating levers, pins passing through the slots of the levers, and a rod connecting said pins to the jaw operating rollers.

14. In means for the purpose set forth, stationary curved guides and cam members, sliding rods, a rotary face plate carrying said rods, rollers on said rods adapted by the rotation of the plate to contact with said guides and cam members, and gripping jaws and a cutter operated by said sliding rods.

15. A wire working machine including a rotary face plate provided with substantially radial slots, fastening elements passing through said slots, quadrants having arc-shaped slots engaged by said fastening elements, projections carried by the quadrants and adapted to receive wire to be wound, gripping jaws carried by the face plate and adapted to alternately engage the wire, and means for alternately actuating said gripping jaws.

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

ARTHUR WYNDHAM BEERE.

Witnesses:

WILLIAM PRICHES,

MARY PILKINGTON.