2 Sheets--Sheet 1.

H. W. YERINGTON.

Making Wire-Fastenings for Bottle-Stoppers.

No. 164,245. Patented June 8, 1875.

Fig. 1

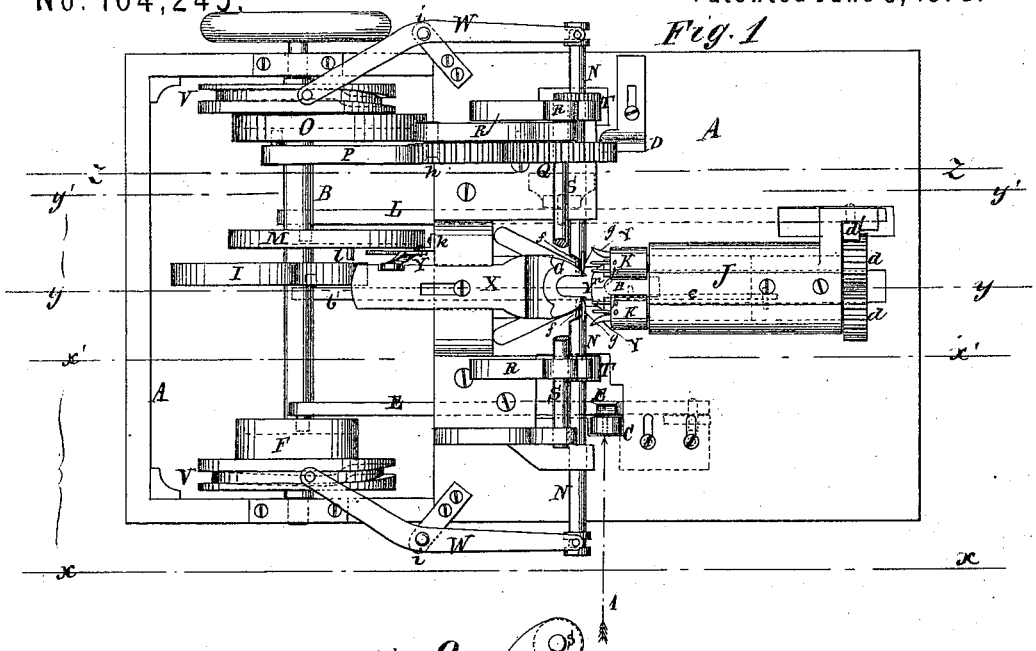


Fig. 2

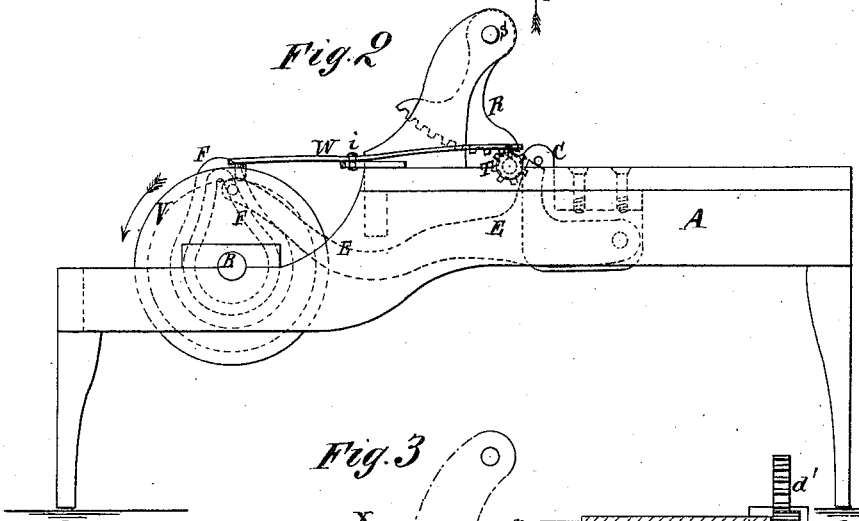
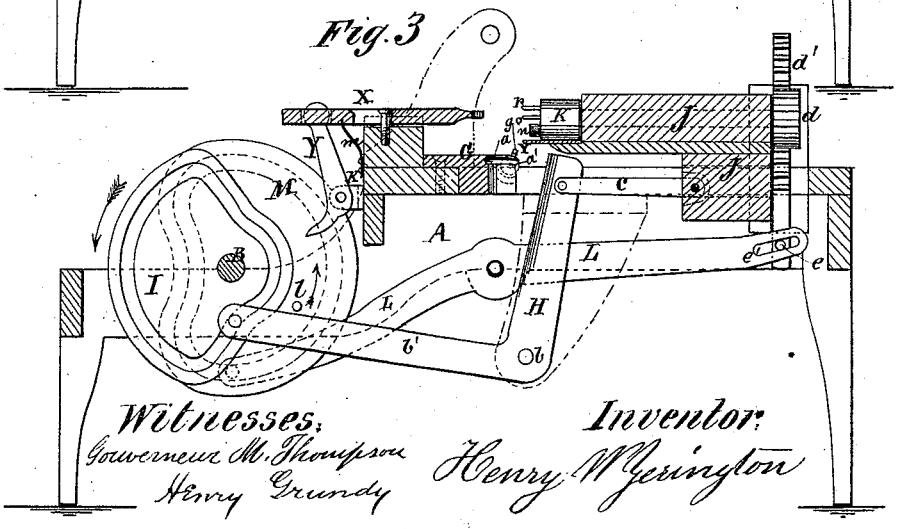


Fig. 3



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H. W. YERINGTON.

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Fig. 4

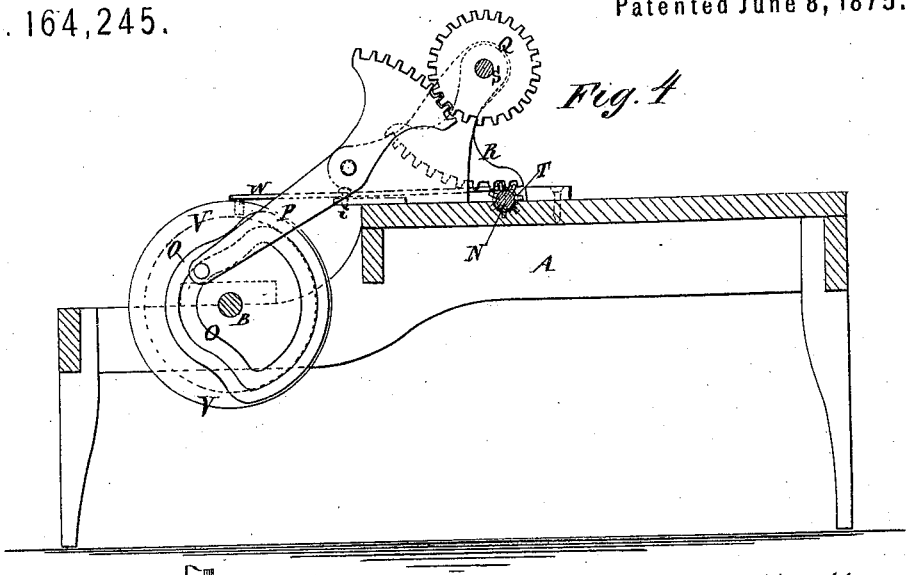


Fig. 5

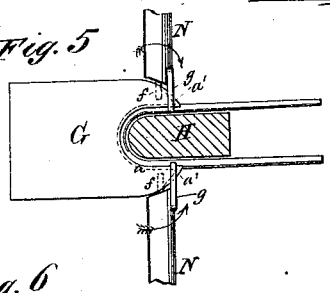


Fig. 6

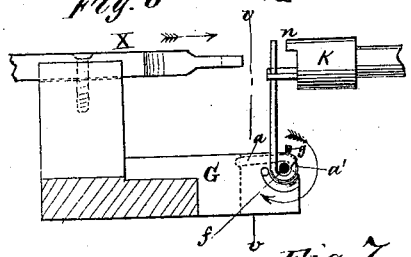


Fig. 7

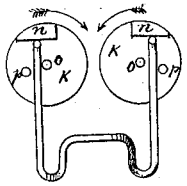


Fig. 9

Fig. 10

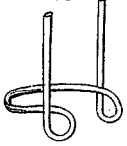


Fig. 8

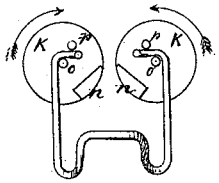


Fig. 11

Fig. 12

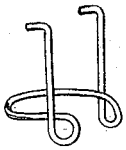
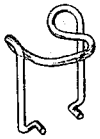


Fig. 13



Witnesses.
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UNITED STATES PATENT OFFICE.

HENRY W. YERINGTON, OF OCEANIC, NEW JERSEY, ASSIGNOR TO ROWLAND C. ANTHONY, OF NEW YORK CITY.

IMPROVEMENT IN MAKING WIRE FASTENINGS FOR BOTTLE-STOPPERS.

Specification forming part of Letters Patent No. **164,245**, dated June 8, 1875; application filed April 17, 1875.

CASE A.

To all whom it may concern:

Be it known that I, HENRY W. YERINGTON, of Oceanic, in the county of Monmouth and State of New Jersey, have invented certain new and useful Improvements in Machinery for Bending and Making Fastenings of Bottle-Stoppers, of which the following is a specification:

My invention relates to improvements in machinery for bending and making the bails or fastenings for the stoppers of bottles, especially bottles charged with an aerated liquid, exerting a pressure upon the stopper.

The wire, of which I prefer to make these fastenings, may be fed into my machine in any of the well-known methods, and its movement being arrested by an adjustable stop, it is cut off into pieces of any required length for the fastening. The piece of wire is first bent at its middle to a U form by the vertical arm of a bell-crank lever, constituting a vertical U-shaped former, moving against a stationary die, constructed with a horizontal opening in its inner end, corresponding in shape with the former, and having cam-sides, provided with sockets, and a continuous groove for the wire in the opening and sides. Two horizontal reciprocating and revolving bending-tools—one on each side of the die, and provided at their inner ends with fingers for bending the wire, and with pivots fitting in the sockets in the sides of the die—next bend the horizontal legs of the piece against the cam-sides of the die, in the grooves, which are of spiral form, in the sides, and round their pivots in the sockets of the die, to a vertical position between two pins in the inner ends of two horizontal revolving and reciprocating cylinders. The legs of the wire are next bent toward the U part by a horizontal reciprocating follower against projecting lips or dies at the inner ends of the two cylinders, above the pins of the cylinders, which moves the legs farther within the pins, and makes a nearly square bend in each leg near its end. The pins of the cylinders finally bend the bent ends of the legs over vertically toward each other to a nearly horizontal position by a quarter-revolution of the cylinders, and finish the fastening.

In the accompanying drawings, making part of this specification, Figure 1 on Sheet 1 is a plan view of a bail-wire machine constructed according to my invention. Fig. 2 is a side view of the same, including the part situated between the lines *x x* and *x' x'* of Fig. 1. Fig. 3 represents a vertical section taken through the line *y y* of Fig. 1, and including the parts situated between that line and the line *y' y'*. Fig. 4 on Sheet 2 represents a vertical section through the line *z z* of Fig. 1. Fig. 5 is a detailed plan view, illustrating the bending the wire into the U shape. Fig. 6 represents a detailed vertical section, illustrating the bending of the legs against the cam-sides of the die and round the pivots, as well as between the follower and the projecting lips or dies of the cylinders. Fig. 7 is a detailed view of the part shown in Fig. 6, (seen from the line *v v* of that figure,) and illustrates the position of the legs of the wire, relatively to the cylinders, after the square bends are made in them, and before the final bends are made. Fig. 8 is a detailed view, similar to Fig. 7, illustrating the bending of the bent ends of the piece to complete the fastening. Fig. 9 is a top view, and Fig. 10 a perspective view, of the bail-wire as it appears after the second operation. Fig. 11 is a top view, and Fig. 12 a perspective view, of the same as it appears after the third operation. Fig. 13 is a perspective view of the fastening as it appears after the fourth operation, or when finished.

The same letters indicate the same parts in the several figures.

The cams V V, F, I, M, and O, placed on the main shaft B, set in the frame A of the machine, are provided with grooves on the sides, except the cams V V, which are grooved on the periphery, and the studs and rollers of levers fit and move in these grooves, and thus the cams give the proper intermittent motions to the parts which act on the wire, and a fastening is made at each revolution of the shaft. The wire is fed into the machine on the left-

hand side in the direction of the arrow 1, Fig. 1, through the hole in the shear-plate C, along the bed, and up to the adjustable stop D, and is cut by the shear E, operated by the cam F. The vertical former H, pivoted at *b* to a bracket on the under side of the bed, and making, with the arm *b'*, a bell-crank lever, with its fulcrum at *b*, and operated by the cam I, next moves forward, and its convex inner end bends the piece of wire into the horizontal female die G, fixed in about the middle of the bed, and the legs of the wire pass into an opening in the bed, where the former moves, and on either side of the former, as shown in Fig. 5. The U form is thus bent into a horizontal groove, *a*, in the opening of the die G, and this groove also extends in a spiral form, *a'*, Figs. 3, 5, and 6, round the inner ends of the die and along its outer sides. The former H is connected by the link *c* beneath the bed to the sliding carriage J, which affords bearings for the cylinders K K and the rack *d'*, and is reciprocated in openings in the bed, (one for the bearing of the cylinders, being a continuation of the opening in which the former H works, and a separate one for the bearing of the rack,) and accordingly the cylinders K K are moved forward during the forming of the U bend. The horizontal shafts N N, mounted in bearings on the bed, are partially rotated by the pinions T T, secured on them and gearing with the cog-segments R R, secured on the upper shaft S, upon which is placed the cog-wheel Q, gearing with another cog-segment onto the end of the lever P, and pivoted with the lever to a bracket on the bed at *h*, the other end of the lever P engaging in the groove of the cam O, which operates it. The shafts N N also receive proper reciprocating motions forward and backward from the cams V V, communicated by the levers W W, pivoted, respectively, at *i i* to arms secured to the sides of the bed, and having at their inner ends studs, which engage in grooves in the shafts N N near their outer ends. The shafts N N are provided at their inner ends with the fingers *g g*, and with the pivots *f f*, which fit and turn in the sockets in the sides of the die. The forward movement of the shafts N N brings the pivots *f f* into the sockets in the sides of the die, and the fingers to a position above the straight legs of the wire, (see Figs. 5 and 6,) and then the shafts N N make three-fourths of a revolution, and simultaneously a partial return movement toward the sides of the machine, thus causing the fingers *g g* to move the legs of the wire downward through the opening in the bed, which also extends beneath and to either side of the die G around the pivots *f f*, and in the spiral grooves *a a'* in the cam-sides of the die G, and upward to a vertical position, (see the arrows in Figs. 5 and 6,) thus making the spiral bends in the legs of the wire shown in Figs. 9 and 10.

During this partial rotation of the shafts N N the cylinders K K make one-quarter of a revolution backward, as hereinafter described, so that the pins *o p o p*, two on the inner end of each cylinder, are brought into a position to receive the vertical legs of the wire, which are moved partly between them by the revolution of the shafts N N. The legs are also guided in their motion from the cam-sides of the die G to their vertical positions between the pins *o p o p* by a suitable guide-plate, Y, provided with two angular slots, (see Fig. 1.) one for each leg, and secured beneath the sliding carriage J above the bed. The cylinders K K are also provided at their inner ends, above the pins *o p o p*, with projecting lips or dies *n n*, against which the follower X, sliding in a bracket set on the bed at the rear side, and moved forward by its lever Y, pivoted at K to the rear side of the frame, and actuated once during each revolution of the shaft B by the pin *l*, secured to the left-hand side of the cam M, acts, and bends the vertical legs near their ends over toward the rear of the machine, to a horizontal position, thus making a square bend in each leg, as shown in Figs. 7, 11, and 12.

The return movement of the follower X is immediately effected by the spring *m*. (Shown in Fig. 3.) The slots in the guide-plate Y also insure the vertical portions of the legs of the wire passing within the pins *o p o p* as they are moved by the follower X against the lips *n n*. The horizontal cylinders K K have two pinions, *d d*, secured to their journals, and geared together, and operated by the vertical rack *d'*, provided with a pin, *e*, at its lower end, working in the slot *e'* of the lever L, pivoted to a bracket on the under side of the bed, and actuated by the cam M. (See Fig. 3.)

The cylinders K K are thus rotated periodically at the proper time, and make less than one-half, and about one-quarter, of a revolution. The slot *e'* allows the rack *d'*, which has its bearing in the sliding carriage J, to be reciprocated in the opening in the bed, before mentioned, during the forward and backward movement of the sliding carriage by the link *c*. The pins *o o* are secured in the center of the inner ends of the cylinders K K, and the pins *p p* are secured out of the center of the cylinders, and below and outside of the pins *o o*. The bent ends of the vertical legs of the wire are next turned over vertically toward each other by the pins *p p* bending them round the center-pins *o o* in the ends of the horizontal cylinders K K, which make about one-quarter of a revolution toward each other, thus forming curved bends in the legs near the square bends previously made, as shown in Fig. 8, which completes the fastening shown in Fig. 13. The former H, together with the sliding carriage J, supporting the cylinders K K and rack *d'*, next make their return movements, as well as the shafts N N, thus

releasing the finished fastening, which drops by its own weight through the opening in the bed.

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

1. The female die G, constructed with the cam-sides and the continuous groove in its end and sides, to form the spiral bends, substantially as described.

2. The cylinders K K, provided with the pins *o p o p* and the lips *n n*, combined together and operated substantially as described.

3. The follower X, combined with the cylinders K K, and operated substantially as described.

4. The combination of the shafts N N, guide-plate Y, cylinders K K, and follower X, arranged and operated substantially as described.

5. The combination of the die G, the former H, the shafts N N, the cylinders K K, and the follower X, operated to make a bottle-stopper fastening, substantially as described.

HENRY W. YERINGTON.

Witnesses:
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G. M. THOMPSON.