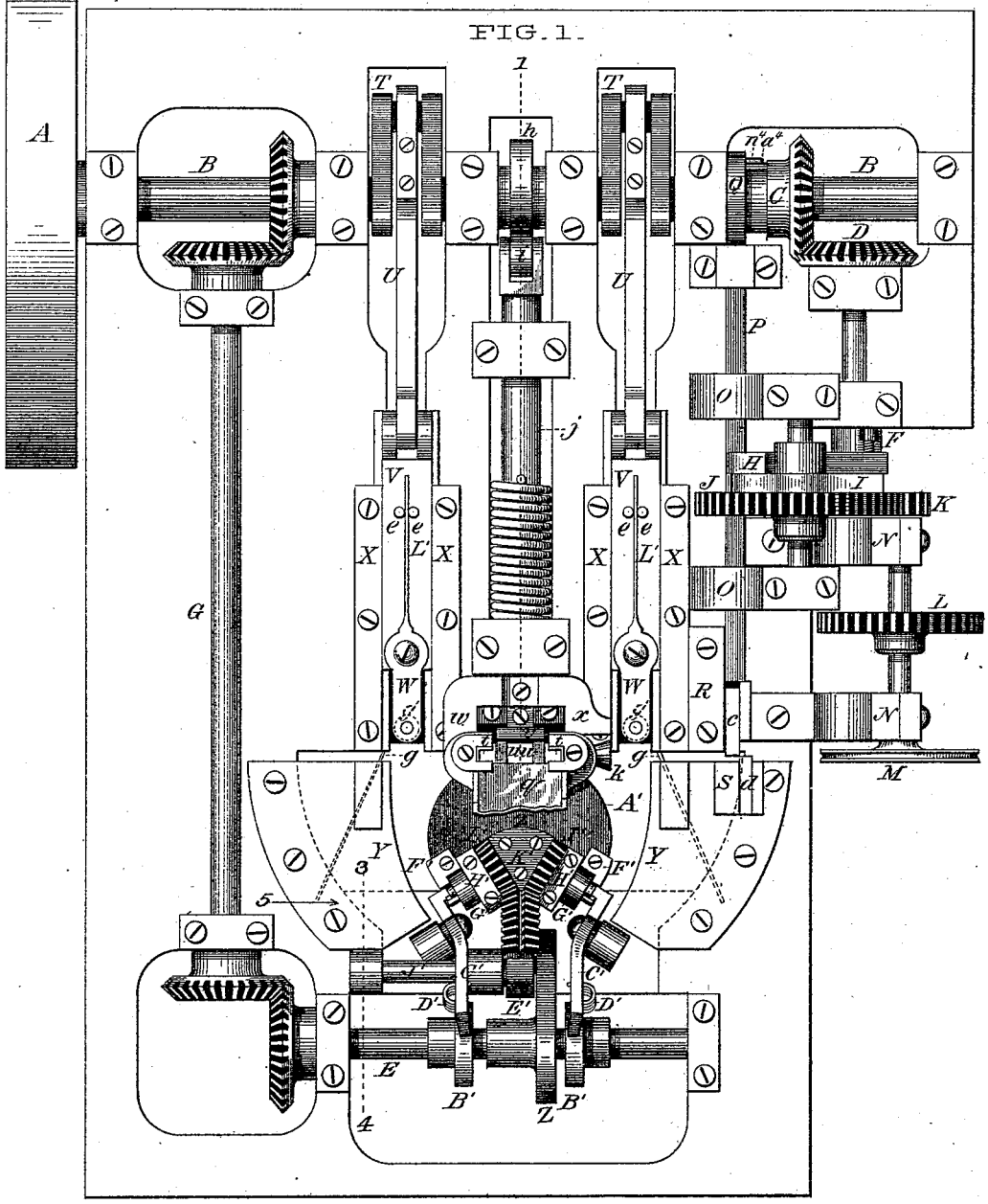
2 Sheets—Sheet 1.

L. WILLIAMS.

Machine for Making Pail-Bails.

No. 213,081. **Patented Mar. 11, 1879.**

FIG. 1.



WITNESSES.

H. D. Hall

M. B. Scott

INVENTOR.

Lewis Williams,

by Franklin Scott, Atty.

L. WILLIAMS.

Machine for Making Pail-Bails.

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FIG. 2.

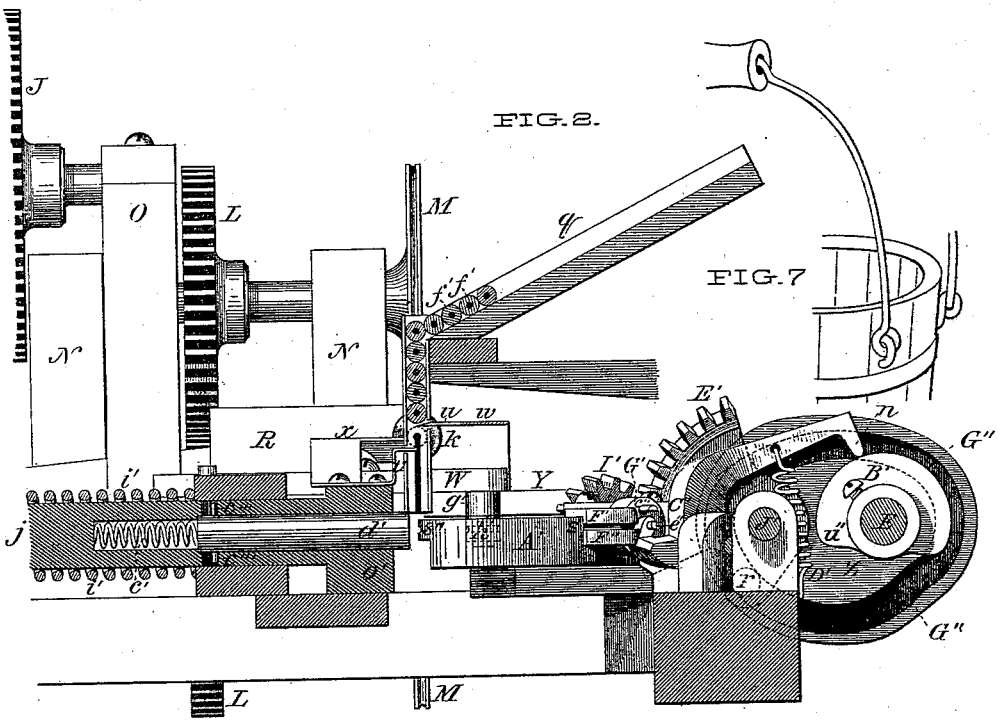


FIG. 7

FIG. 3.

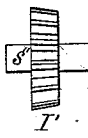


FIG. 4.

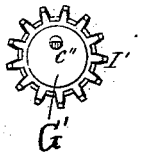


FIG. 5.

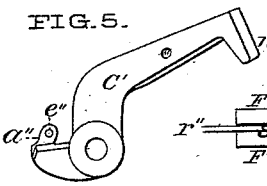
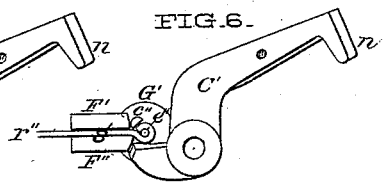


FIG. 6.



WITNESSES.

H. D. Hall

M. B. Scott

INVENTOR.

Lewis Williams,

by Franklin Scott,

Atty.

UNITED STATES PATENT OFFICE.

LEWIS WILLIAMS, OF BENNINGTON, VERMONT.

IMPROVEMENT IN MACHINES FOR MAKING PAIL-BAILS.

Specification forming part of Letters Patent No. **213,081**, dated March 11, 1879; application filed October 24, 1878.

To all whom it may concern:

Be it known that I, LEWIS WILLIAMS, of Bennington, in the county of Bennington and State of Vermont, have invented an Improvement in Machines for Making Pail-Bails, of which the following is a specification:

This invention relates to improvements in machinery for forming the eyes of pail-bails constructed from wire, and is a modification of the machine for making pail-bails for a United States patent upon which I made application July 25, 1878, and upon which application Letters Patent of the United States of America No. 209,998, bearing date November 19, 1878, were duly issued to me.

In both cases substantially the same machinery is employed for supplying the handles or woods to the machine for feeding in and cutting off the wire, passing it through the handle, forming the offsets in the wire at each end of the handle, and forming the principal semicircular bend of the bail, for a specific description of which reference may be made to said Letters Patent.

In the accompanying drawings, consisting of two sheets, which form part of this specification, Figure 1 is a plan view of my invention. Fig. 2 is a view, in elevation, of an irregular vertical longitudinal section of my machine, taken on the lines 1 2 and 3 4 of Fig. 1, and exhibits that aspect of such section which is presented when viewed in the direction of arrow 5. Figs. 3 and 4 are, respectively, side and end elevations of the device for bending the wire at the ends of the bail to form the "eyes." Fig. 5 shows a side elevation of the crimp-lever which carries the stud around which the eye is formed. Fig. 6 shows the combination and co-operation of the wire-guides, winder, and crimp-lever in forming the eye of a bail, and also shows the style of eye formed by this machine; and Fig. 7 shows a bail made by this machine and its mode of attachment to an ordinary pail.

Bails shaped by this machine are adapted to be attached to pails or buckets by means of hooks or staples driven into or otherwise attached to the side of the pail, which hooks or staples serve as ears, as seen in Fig. 7.

In addition to the machinery above alluded to for carrying out the several manipulations of the bail-wire prerequisite to the formation of the eyes at the ends of the bail, I have provided a fixed or stationary former, A′, having its front edge recessed away for the reception of the bail-handle, and provided on either side of said recess with a die in all respects like the recess and dies found described in said Letters Patent, and having its bending contour of similar shape.

At each heel of former A′ is constructed a grooved wire-guide, either made solid or composed of two cheek-pieces, F′ and F″, Figs. 1, 2, and 6, of which the under one, F″, projects to the rear slightly beyond the upper one, F′.

The groove for the reception and confinement of the end of the bail-wire lies between said cheeks, as seen at *s*′, Fig. 2.

Upon the upper surface of former A′ are mounted, in suitable bearings H′ K′ H′, the winders G′ G′. The inner end of each of said winders is provided with a bevel gear or pinion, I′ I′, which engages with and receives motion from the duplex segmental bevel-gear E′, mounted on shaft J′.

From the center or hub of duplex gear E′ is a projecting arm, to the outer extremity of which is attached a laterally-projecting stud or friction-bowl, *r*, (all shown in broken lines in Fig. 2,) which stud or projection *r* works in and receives action from cam-groove G″ G″ of driving-cam Z.

The shape and configuration of cam-groove G″ are such as to impart to duplex gear E′, through projection *r*, working therein, a reciprocating rotary movement, and thence to the winders G′ G′, through pinions I′ I′, a reciprocatory rotary movement of something less than a complete revolution.

Each of the disks or winders G′ G′ is provided with a projecting pin or finger, *c*″, Figs. 1, 3, 4, and 6, the function of which is to engage the free end of the bail-wire as it is confined between cheeks F′ and F″, and wrap or wind the same around stud *e*″ of crimp-lever C′, as shown in Fig. 6.

Crimp-levers C′ C′ are pivoted upon independent centers having their axes of oscillation parallel with the axes of winding-disks G′ G′, and a little in rear thereof. They are

rights and lefts in form, and of the general shape shown in Figs. 2 and 5. They receive their vibratory movement from cams B′ B′ on shaft E, acting on tappets *n n* at the extremities of the long arms of said levers.

From the inside face of the short arm of crimp-lever C′ extends a peculiarly-shaped lateral projection or wing, *a″*, having its upper contour concentric with stud *e″*.

To the long arm of lever C′ a retractile spring, D′, is attached, the other end of which is connected with the frame of the machine. These springs serve to keep the tappets *n n* in contact with the peripheries of cams B′ B′.

When the tappets are riding on the lowest portion of the edges of cams B′ B′, or on that portion nearest the shaft E, the stud *e″* will be elevated above the groove between cheeks F′ and F″, so that the wire of the bails undergoing formation, in process of being wrapped or bent around the edge of former A′ and forced into groove *s′* by the wire-benders W W, will be brought directly under and athwart stud *e″*, in a position spanning its path of rotation.

Motion is imparted to shaft E and its cams, upon which the mechanism for forming the bail-eyes is dependent from main driving-shaft B, through counter-shaft G and appropriate gearing.

The operation of the machine is as follows: Presupposing that the wire has been fed into the machine by means of feed-rolls M M, passed through one of the handles *f′ f′*, cut off by shear-blades *c d*, dropped into position in front of former A′, there grasped and held while the offsets at each end of the handle were formed, bent around the edge of former A′ by means of wire-benders W W moving up against the wire, and by reason of the resistance offered by wire-bender guides Y Y, wrapping the same around the edges of said former A′ until the extremities lie in the grooves *s′ s′*, we arrive at that stage in the process where the eye-forming devices come into action.

While the last-described operations have been going on, the several devices for forming or bending the eye proper of the bail have lain dormant, for the reason that stud *r*, attached to the duplex segmental gear E′, has lain in the concentric or inoperative portion of the cam-groove G″ of driving-cam Z, and tappets *n n* have been in contact with the lowest concentric or inoperative portion of cams B′ B′, thus elevating the studs *e″ e″* above and over the position to be occupied by the end of the bail-wire after the same has, by the wire-benders W W, been forced into position in grooves *s′ s′* to be acted upon. At this time winding-finger *c″* of disk G′ occupies a position underneath and to the right of wing *a″*, as viewed in Fig. 5, and segment-gear E′ is rotated down to the lowest limit of its path of travel. From this point the further progressive revolution of shaft E will first bring the incline *w″* of cam B′ against tappet *n*, thus causing the elevation of the long arm of crimp-lever C′, and a consequent depression of the short arm to which wing *a″* is attached. Such depression brings stud *e″* to bear against wire *r″* as it lies in groove *s′*, just opposite the projecting extremity of cheek F″, which presents an abutment of resistance to the wire. The result of the depression is, that the end of the bail-wire is bent down across the corner or ledge of cheek F″ as the initial step toward forming the eye, and at the same time stud *e″* is brought into axial conjunction with the center of disk G′, where it remains stationary during the performance of the consequent operations necessary to complete the bending of the eye by reason of the tappet *n* riding upon the highest concentric portion of the periphery of cam B′.

From the instant stud *e″* has been thrown into position opposite center of disk G′, grooved cam Z commences to act on stud *r* by forcing it downwardly or away from the axis of movement of cam Z, thus producing an upward rotary movement of segment-gear E′, and, by its engagement with and action upon pinion I′, causes a partial revolution in the opposite direction of disk G′ to the extent of carrying winding-finger *c″* from its position under wing *a″*, around stud *e″*, to the position shown in Fig. 6.

By reason of the engagement of finger *c″* with the extremity of the bail-wire in the last-described movement the wire is bent or wound around stud *e″*, as seen in Fig. 6, and a complete and perfect eye is formed. From this point the further revolution of grooved cam Z brings into action upon stud *r* the retracting portion of groove G″, thereby causing segment E′, pinion I′, and disk G′ to reverse their respective rotary movements and return to the positions respectively occupied by each before the described operation of bending an eye was commenced. The same revolution of cam-shaft E will also have carried cam B′ around, so that tappet *n* will rest or bear on the lowest concentric portion of the periphery of cam B′, whereby stud *e″* will be returned to its former position above the plane of groove *s′*, as before the bending commenced.

Upon the completion of the process of bending the eye the spring of the bail-wire effects its own release from connection with the bending appliances, all of which having receded from contact with the bail-wire, the same is free to spring out and drop to the floor or into any suitable receptacle; hence,

I claim as new and of my invention—

In machines for automatically manufacturing pail-bails from wire, the combination of the group of co-operative devices for producing the initiative bend in the formation of the eye of the bail, embracing cheeks F′ F″ and crimping-levers C′ C′, armed with wings *a″* and center studs, *e″*, with the group of co-operative

devices for completing the formation of the eye by winding or bending, embracing disks G′, armed with winding-fingers c'', and adapted to execute a reciprocating rotary movement through the agency of cams and levers or other suitable appliances, substantially as described, and for the purposes set forth.

In testimony whereof I have hereunto subscribed my name this 4th day of October, A. D. 1878.

LEWIS WILLIAMS.

In presence of—
FRANKLIN SCOTT,
N. A. BURRITT.