E. L. BLAKESLEE.

FORMING MACHINE.

APPLICATION FILED JUNE 1, 1915.

1,180,469.

Patented Apr. 25, 1916.

4 SHEETS—SHEET 1.

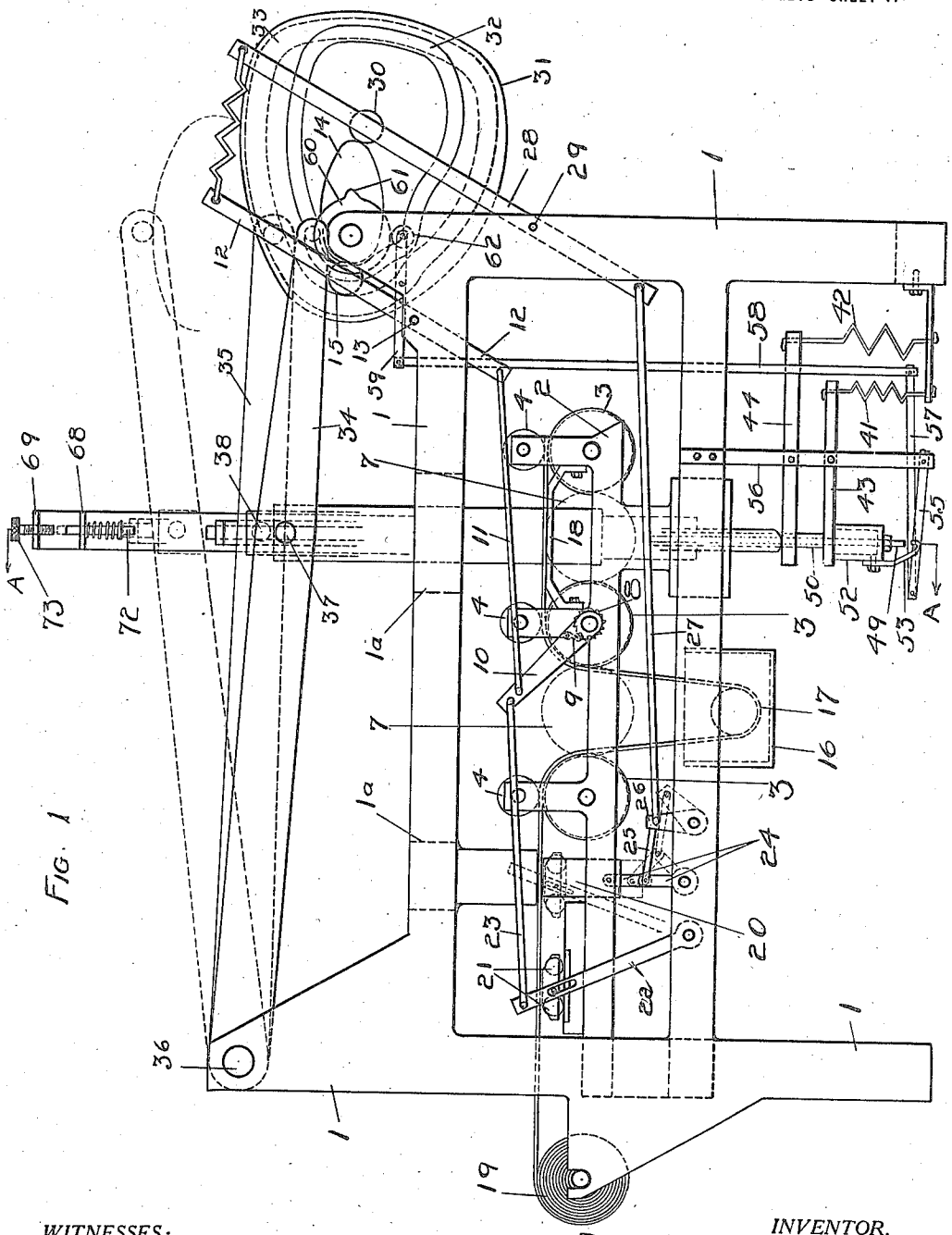


FIG. 1

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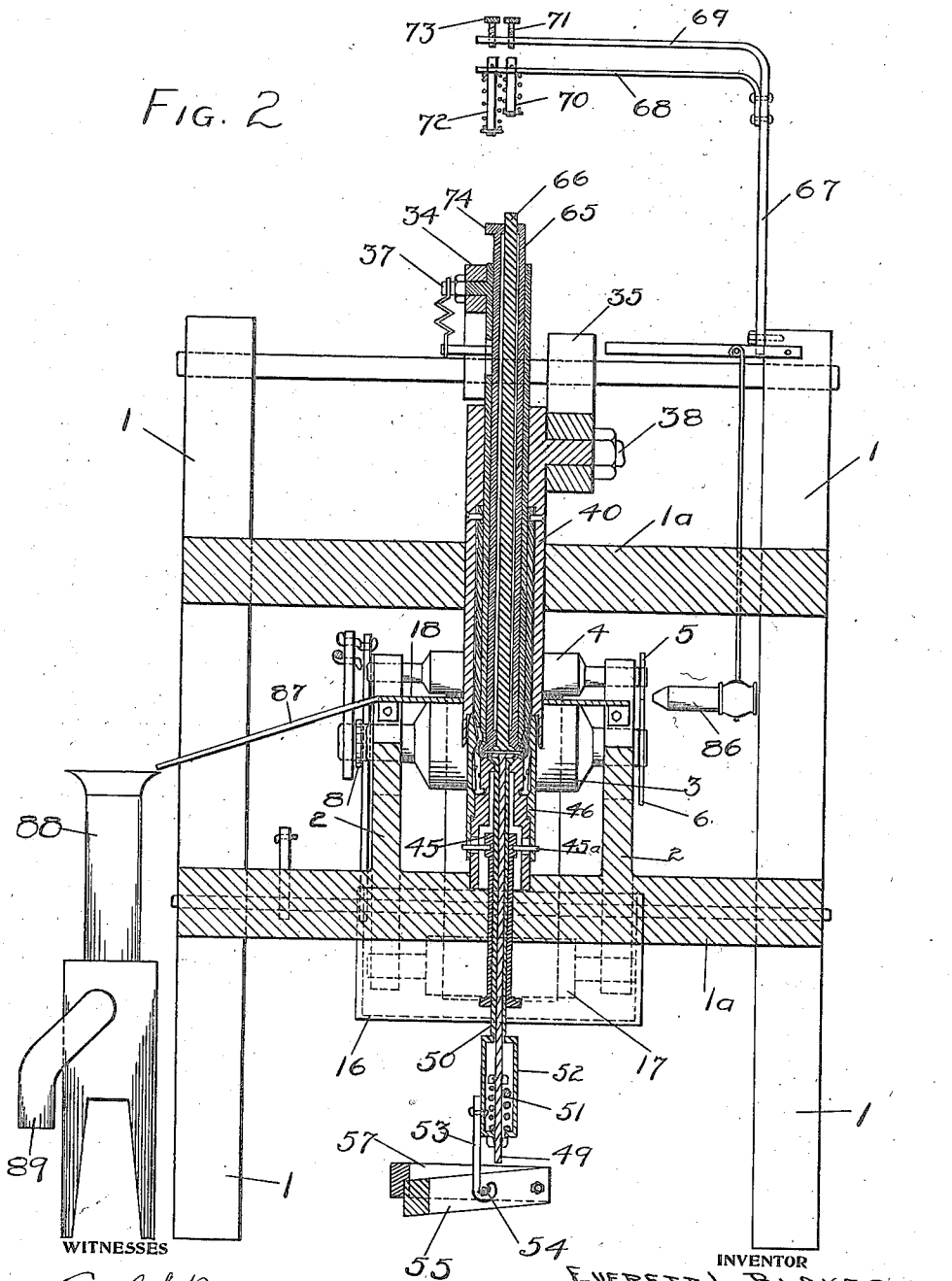
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4 SHEETS—SHEET 2.

FIG. 2



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4 SHEETS—SHEET 3.

FIG. 3

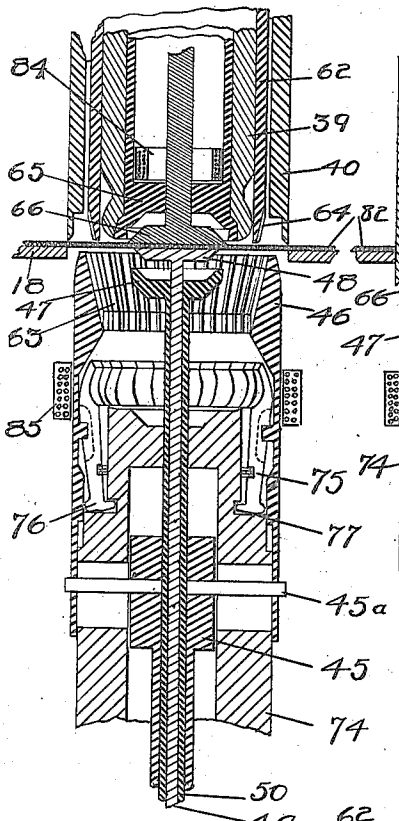


FIG. 4

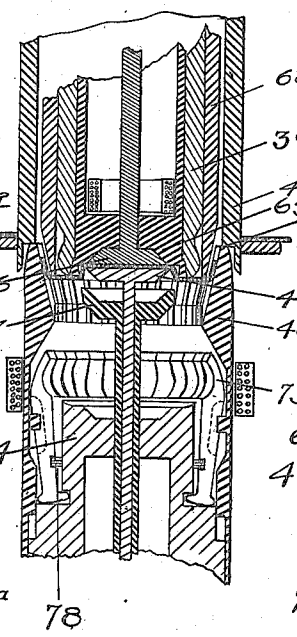
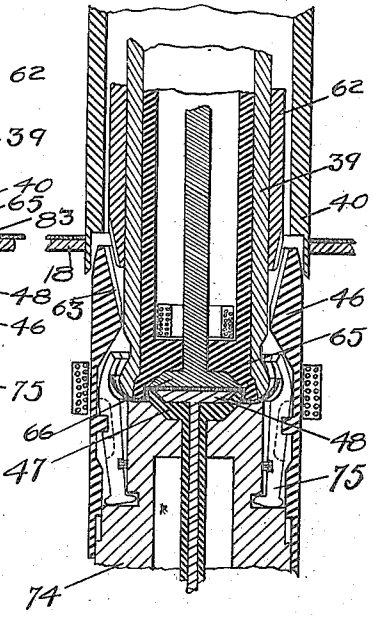
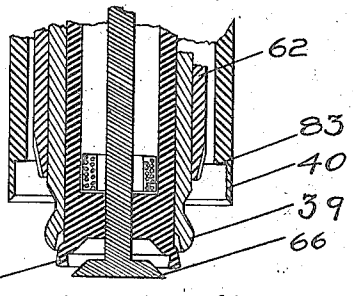


FIG. 5





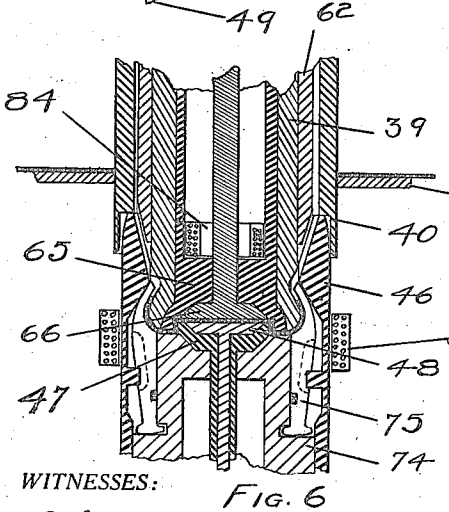


FIG. 6

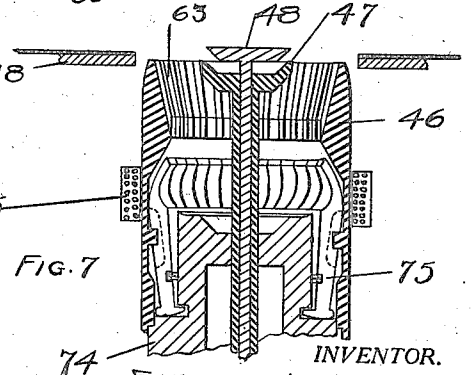


FIG. 7

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4 SHEETS—SHEET 4.

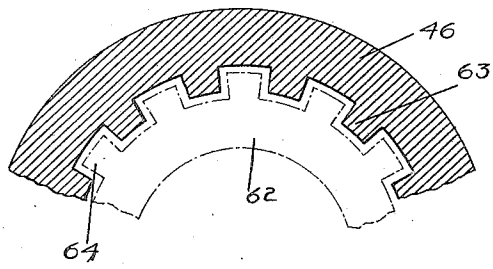


FIG. 9

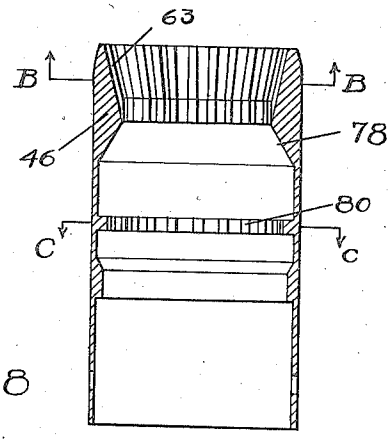


FIG. 8

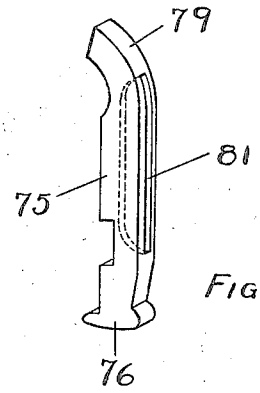


FIG. 10

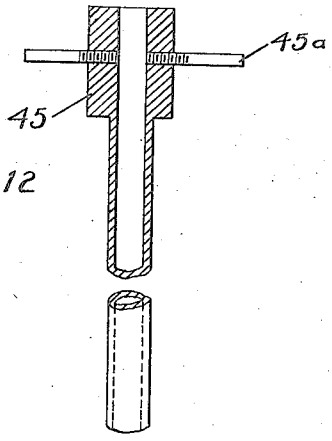


FIG. 12

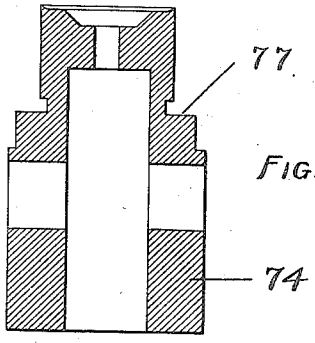


FIG. 11

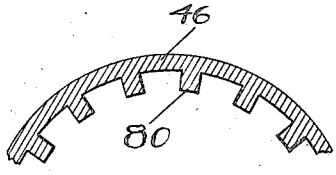


FIG. 13

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FORMING-MACHINE.

1,180,469. Specification of Letters Patent. Patented Apr. 25, 1916.

Application filed June 1, 1915. Serial No. 31,628.

To all whom it may concern:

Be it known that I, EVERETT L. BLAKESLEE, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented certain new and useful Improvements in Forming-Machines, of which the following is a specification.

My invention relates to forming machines in general, and particularly to that class of forming machines adapted to form paper into small articles such as milk bottle caps, the manufacture of which is the object of my invention.

My invention may be understood by reference to the accompanying drawings which form a part of this application for Letters Patent, and in which:—

Figure 1 is a diagrammatic side elevation of my machine. Fig. 2 is a transverse section on line A A of Fig. 1. Figs. 3, 4, 5, 6, and 7 are transverse sections through the forming dies, showing successive stages of the forming operation. Fig. 8 is a detail of the lower crimper. Fig. 9 is a section on line B B of Fig. 8 with the mating crimper also shown in mesh by broken lines. Fig. 10 is a perspective detail view of the forming fingers. Fig. 11 is a transverse section of the lower die-head. Fig. 12 is a detail of the rod and crosshead operating the lower crimper and forming fingers. Fig. 13 is a transverse section on line C C of Fig. 8, showing the radial guides for the forming fingers.

Like characters designate like parts throughout the several views of the drawings, in which:—

Numeral 1 is the main frame of my invention, being in the form of two side members with cross ties 1^a.

An auxiliary frame 2, attached to the lower cross tie 1^a between the main frames 1, carries feed rollers 3 and 4. The feed rollers are in pairs, vertically disposed, and are caused to revolve with the same constant peripheral speed by means of intermeshing gears 5 and 6 fixed upon the roller shafts, as shown in Fig. 2.

Idler gears 7 are provided to cause the several sets of feed rollers to operate simultaneously.

The feed rollers are given an intermittent motion by means of a ratchet wheel 8 attached to one of the roller shafts, a ratchet dog 9 mounted upon a lever 10, which lever is connected by reach rod 11 to lever 12, to which is imparted an oscillating motion about shaft 13 by means of cam 14, and roller 15 mounted upon lever 12.

Located beneath and intermediate the rear two pairs of the feed rollers is a receptacle 16 supported upon the side frames 1, and adapted to contain water or other liquid for preparing the paper for the dies, said container having a roller 17 therein to guide the paper.

Above and intermediate the forward two pairs of feed rollers is mounted a table 18 having an orifice through which operates the die-head to be described later.

A roll of paper stock 19 is mounted at the rear of the main frame and the paper web is led therefrom between the rear pair of feed rollers, thence through receptacle 16 to the intermediate pair of feed rollers, thence immediately above table 18 to the forward pair of feed rollers, where the waste material is discharged

Between the paper roll 19 and the rear feed rollers is mounted a printing press, consisting of a type-box 20 and a pair of inking rollers 21, as shown in Fig. 1. The inking rollers are given an intermittent motion by means of slotted lever 22 and reach rod 23 which connects lever 22 with lever 10 operating the feed rollers.

The type-box is given a reciprocating motion normal to the surface of the paper web by means of toggle links 24, reach rod 25 connected thereto, lever 26 and reach rod 27 connecting said lever with lever 28, to which is imparted an oscillating motion about shaft 29 by means of cam 14 and roller 30 mounted upon lever 28.

The timing of cam 14 in connection with the levers 12 and 28 operated thereby, and the systems of mechanisms described as connected respectively with said levers, is such that the paper web is stationary while the dies are operating to cut the blank and form the product, and during this interval the type-box 20 is raised and lowered, leaving an imprint upon the paper web, and the printing press is located so that one such imprint will lie exactly concentric with the axis of the die-heads each time the paper web is brought to rest.

While the paper web is making its periodical movement, the type-box is dropped, and the inking rolls are moved over the type and returned to their initial position.

The die-heads, upper and lower, are operated by means of a large plate 31 having cam grooves 32 and 33 upon its respective surfaces, which cam grooves operate respectively arms 34 and 35 fulcrumed on shaft 36, as shown in Fig. 1. Arm 34 is connected by pin 37 to the cupping die 39, and arm 35 is connected by pin 38 to the cutter 40, thus providing the required irregular reciprocating motion for the upper die-head and the several members thereof.

The lower die-head, and the several members thereof, are caused to follow the upper head by means of springs 41 and 42 and levers 43 and 44. Lever 44 operates upon the stem of crosshead 45, which is connected by pins 45^a to lower crimper 46. Lever 43 operates upon the stem of male die 47.

A stripper 48 is located within the male die 47, said stripper having a stem 49 extending down through the hollow stem 50 of die 47, and having upon its lower end a spring 51 and spring cage 52 adapted to cause said stripper normally to lie within male die 47. Depending from spring cage 52 is a hook 53 adapted to receive a pin 54 secured to a link 55, and thus cause said link to follow the motion of the lower die-head. Said link 55 is fulcrumed in a depending bar 56 attached to frame 1. Pivotally attached to the extreme end of link 55 is a link 57 immediately below and in the path of stem 49 of stripper 48. Link 57 follows the reciprocating motion of link 55 to which it is pivotally attached, and is also given an independent reciprocating motion by means of reach rod 58, lever 59 pivotally attached to frame 1, and cam 60 having a projection 61 adapted to engage a roller 62 mounted in lever 59. The timing of cam 60 and its connections to link 57 are such that stripper 48 is positively caused to leave male die 47 when said die is at the uppermost point of its travel. Located within cutter 40 of the upper die-head is a crimper adapted to enter crimper 46 of the lower die-head. These crimpers (46 and 62) are made male and female with intermeshing corrugations 63 and 64 respectively, said corrugations being upon male and female conical surfaces upon their respective crimpers, and having a small space or clearance when entirely intermeshed, as shown in diagram in Fig. 9. A female forming die 65 is mounted within cupping die 39 of the upper die-head, and within said die 65 is mounted a stripper 66.

Attached to the main frame is an arm 67 (see Fig. 2) which carries two horizontal members 68 and 69. Mounted in arm 68 concentrically with stripper 66 is a pin 70 adapted to contact with the stem of stripper 66 at approximately its uppermost point of travel. Immediately above pin 70, and mounted in member 69 is an adjusting screw 71 adapted to limit the travel of pin 70 and thus positively to cause stripper 66 to leave die 65 when said die reaches its uppermost point of travel. A similar arrangement consisting of pin 72 and adjusting screw 73 contacts with lug 74 upon the stem of die 65, causing said die positively to leave cupping die 39 at the uppermost point of travel thereof.

Within the lower die-head is a block 74 (shown in detail in Fig. 11) around the periphery of which are a plurality of folding fingers 75 (shown in detail in Fig. 10), said fingers having rounded ends 76 adapted to rest upon shoulder 77 of said block. A coil spring 78 is placed around block 74 inside fingers 75 to keep said fingers normally pressed outward against crimper 46, as shown in Figs. 3, 4, and 5. Crimper 46 is provided with a female conical surface 78 adapted to contact with a curved surface 79 upon the fingers 75. Crimper 46 is also provided with a series of internal teeth 80 (see Figs. 8 and 13), each tooth being adapted to engage a slot 81 in one of the fingers 75, and thus confine each finger to a radial reciprocating motion relative to the die axis.

The sequence of operations of the dual die-heads is shown in Figs. 3, 4, 5, 6 and 7, and is as follows:

Fig. 3. The paper web 82 is held between strippers 48 and 66, and knife 40 is about to cut out a blank by descending through table 18.

Fig. 4. The blank has been cut, and die 65 has passed down over the strippers 48 and 66, thus forming the paper up into die 65, and simultaneously with this action the entire upper die-head has descended until shoulder 83 of knife 40 rests upon the upper end of crimper 46, thus carrying crimper 62 downward into crimper 46 and turning up the edge of the paper blank, and crimping said edge to accommodate the surplus material due to the restricted diameter after being upturned.

Fig. 5. Die 65 has descended over die 47, and the said dies with their strippers have simultaneously descended until the lower end of die 65 rests upon the upper end of block 74. The paper (now partially formed) is now held firmly between the stripper 66 and die 65 above, and the stripper 48, die 47 and block 74 beneath.

Fig. 6. Cutter 40 now descends carrying with it crimper 46 (by means of the contact between said cutter and said crimper at shoulder 83 of the cutter), and by means of the conical female surface 78 of said crimper 46 passing downward over the fingers 81, said fingers are crowded toward the die axis, thus folding the upturned edge of the blank over the cupping die 39. The edge of the blank having been previously crimped by the crimpers (see Fig. 4), this action of the fingers forces the numerous folds left

by the crimpers into hard contact with one another. The formation is now complete, and the die-heads are allowed to rest in the position shown in Fig. 6 while the formed paper is set by means of heat supplied each die-head in any convenient manner (by electric heaters 84 and 85, as shown in the drawings).

Fig. 7. The upper die-head withdraws simultaneously followed by stripper 48 and die 47. At the uppermost point of travel of die 47, link 57 contacts with stripper stem 49 and positively drives stripper 48 above die 47, thus stripping the formed product from die 47 and leaving said product upon forming die 65 and cupping die 39 in the upper die-head. Further upward travel of the upper die-head causes the stem of die 65 to contact with pin 72, which thereby forces die 65 out of cupping die 39, carrying the formed product therewith. A still further upward movement of the upper die-head causes the stem of stripper 66 to contact with pin 70, thus forcing said stripper out of die 65 carrying the formed product therewith. The formed product then drops by gravity from stripper 66. As the formed product leaves stripper 66, a blast of air from nozzle 86 (said nozzle being connected to an air compressor and operated periodically, coincident with the release of each piece of formed product) blows same off table 18 onto chute 87 and thence into a paraffiner 88, as shown in Fig. 2, whence the finished product emerges through spout 89, formed, printed and paraffined.

Having thus described my invention so that others skilled in the art may be enabled to construct and use same, what I claim as new, and desire to secure by Letters Patent, is:—

1. A forming machine to operate upon a paper web, comprising a positively actuated vertically reciprocating die head, a plurality of feed rollers, a printing device, and a frame, in combination with a vertically reciprocating floating die head, said floating die head being coaxially mounted relatively to said positively driven die head and adapted to engage the same, a receptacle located in the path of said paper web adapted for holding a liquid for preparing the paper for the action of said die heads, and means to cause said paper web to enter and to leave said receptacle prior to reaching said die heads.

2. A bottle cap forming machine comprising a duality of reciprocating die-heads, a frame wherein said die-heads are mounted, cams to operate said die-heads, intermittently operated means for feeding a paper web between said die-heads, means for removing the formed product from between the die-heads, said means being an intermittently operated blast of compressed air directed normally to the axis of said dies, and means to paraffin the formed product.

3. In a bottle cap forming machine, a duality of reciprocating die-heads, one of said die-heads being composed of an annular cutter, an annular male crimper within said cutter, an annular cup-forming die within said crimper, a female forming die within said cup-forming die, and a stripper within said female forming die; the other die-head being composed of an annular female crimper adapted to receive said male crimper, said female crimper having an interior conical surface, an annular block within said female crimper, a plurality of fingers annularly arranged between said female crimper and said block, said fingers being held normally away from said block by means of an annular spring and being adapted to engage said interior conical surface of said female crimper, a male-forming die within said annular block and adapted to engage said female-forming die, and a stripper within said male-forming die; said male and female crimpers having corrugations upon respectively convex and concave conical surfaces thereon, said corrugations being adapted to intermesh when said male and female crimpers are brought into juxtaposition; means for heating said die-heads, and means for operating said die-heads with a properly timed synchronous movement of the various parts.

In witness whereof I claim the foregoing as my own, I hereunto affix my signature in the presence of two subscribing witnesses.

EVERETT L. BLAKESLEE.

Witnesses:

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A. BACKSTRAND.