April 20, 1948. H. P. ECK ET AL 2,440,080

MACHINE FOR TRIMMING PRIMER CUPS AND THE LIKE

Filed June 3, 1943 3 Sheets-Sheet 1

Fig. 2.

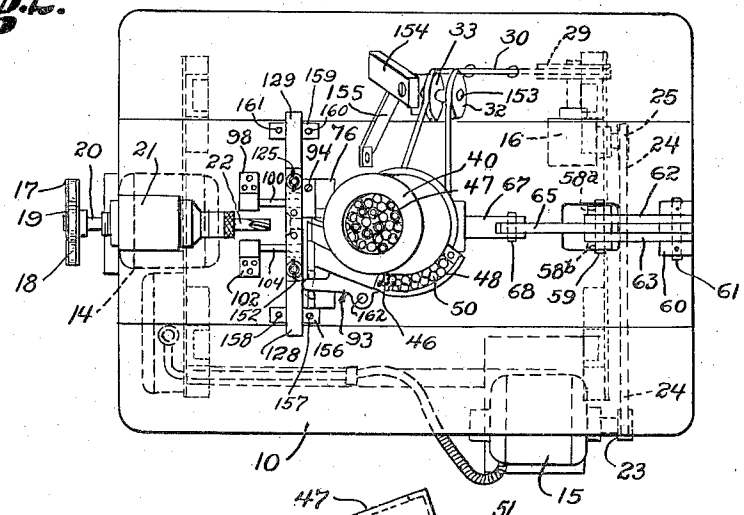


Fig. 1.

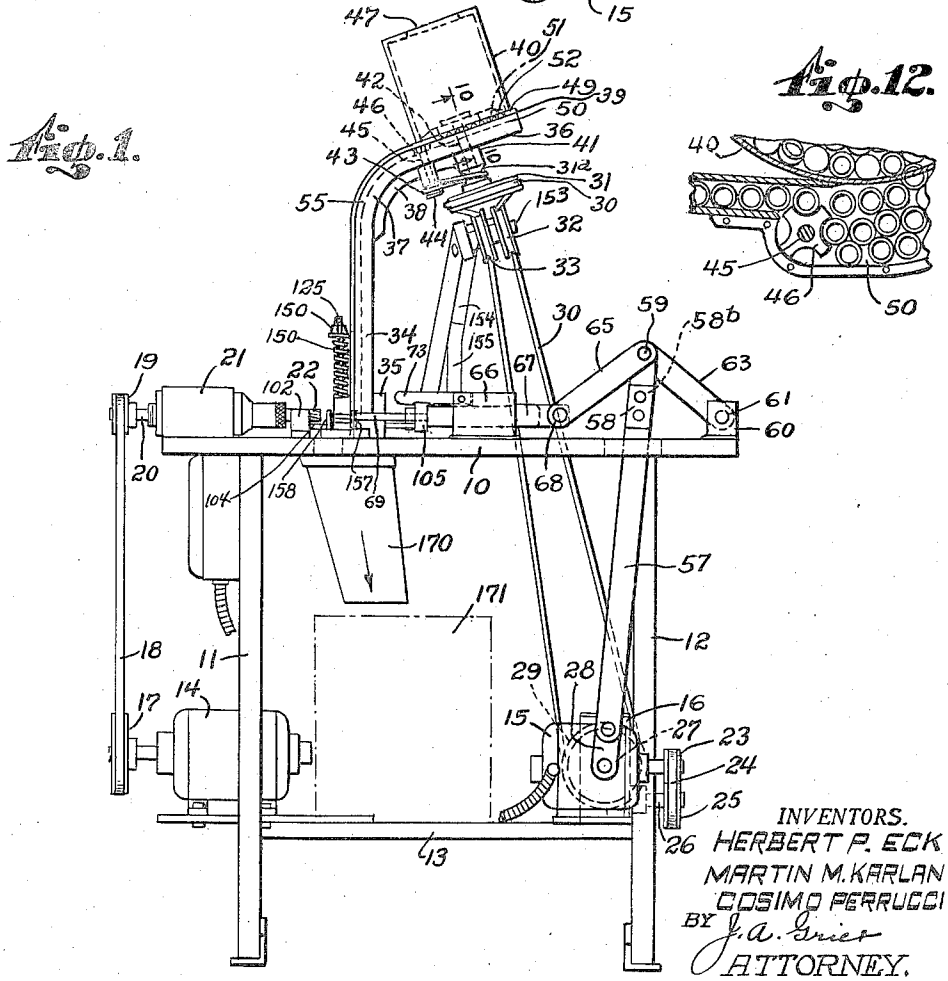


Fig. 12.

INVENTORS.
HERBERT P. ECK
MARTIN M. KARLAN
COSIMO PERRUCCI
BY J. A. Grier
ATTORNEY.

April 20, 1948. H. P. ECK ET AL 2,440,080

MACHINE FOR TRIMMING PRIMER CUPS AND THE LIKE

Filed June 3, 1943 3 Sheets-Sheet 2

Fig. 4.

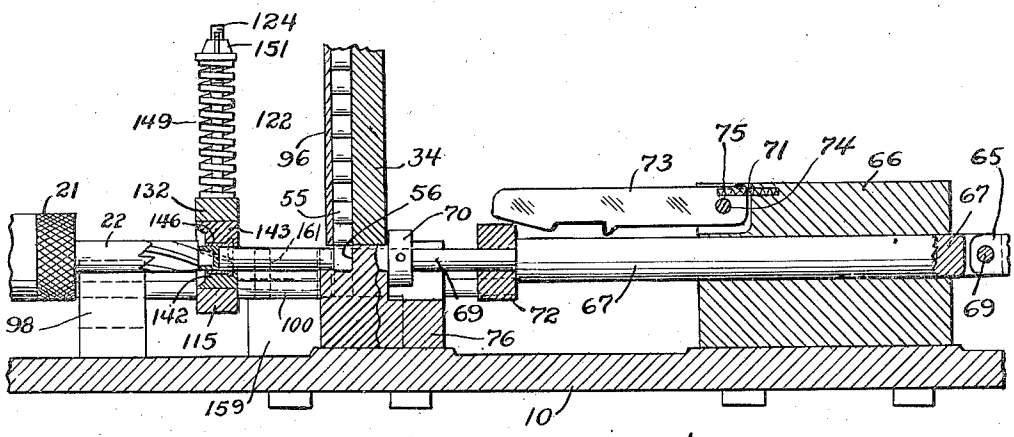


Fig. 11.

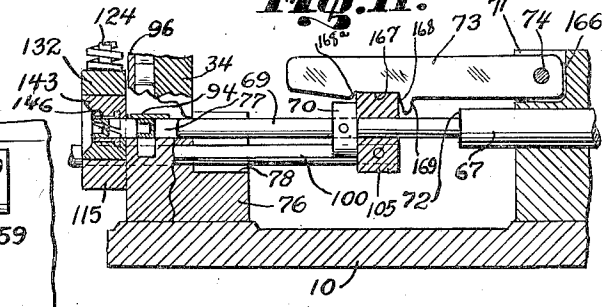


Fig. 3.

INVENTORS.
HERBERT P. ECK
MARTIN M. KARLAN
COSIMO PERRUCCI
BY J. A. Grier
ATTORNEY.

April 20, 1948. H. P. ECK ET AL 2,440,080

MACHINE FOR TRIMMING PRIMER CUPS AND THE LIKE

Filed June 3, 1943 3 Sheets-Sheet 3

Fig. 8.

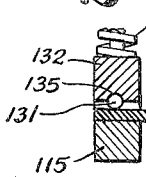


Fig. 6.

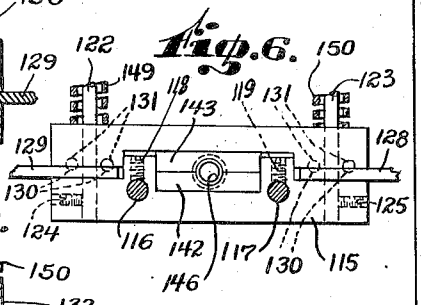


Fig. 7.

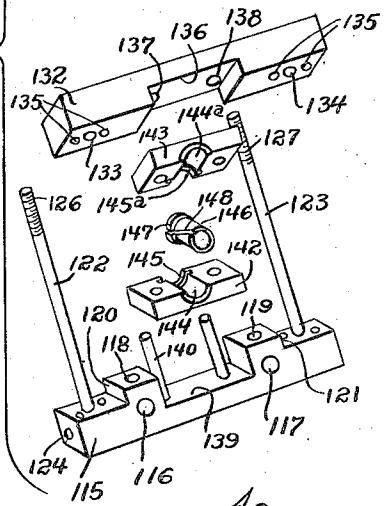


Fig. 9.

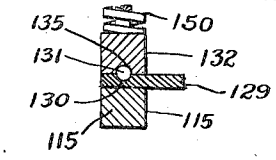


Fig. 5.

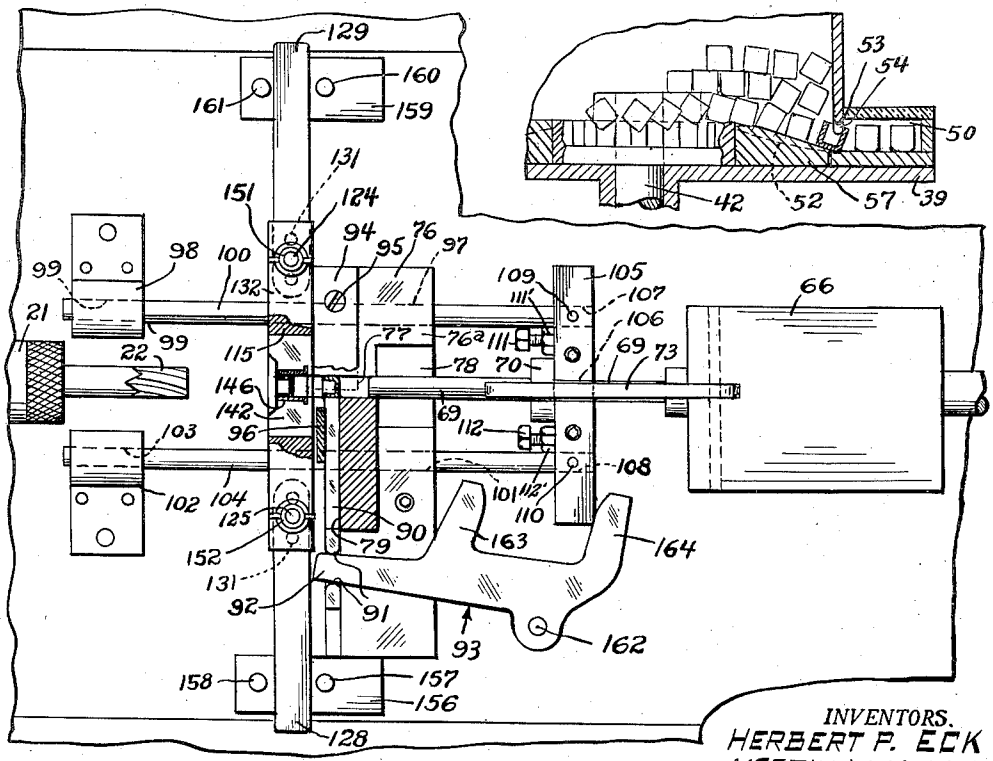


Fig. 10.

INVENTORS.
HERBERT P. ECK
MARTIN M. KARLAN
COSIMO PERRUCCI
BY J. A. Grier
ATTORNEY.

Patented Apr. 20, 1948

2,440,080

UNITED STATES PATENT OFFICE

2,440,080

MACHINE FOR TRIMMING PRIMER CUPS AND THE LIKE

Herbert P. Eck, Martin M. Karlan, and Cosimo Perrucci, New York, N. Y.

Application June 3, 1943, Serial No. 489,518

6 Claims. (Cl. 90—21)

1

This invention relates to improvements in machines for trimming primer cups and the like and has for a principal object the provision of a machine for automatically orienting primer cups or other cup-like members, sequentially presenting them to a finishing tool, and discharging them from said machine.

Another object of the invention is the provision of a hopper spaced apart from and connected to said machine by means of a chute, said hopper being adapted to receive primer cups or the like and including driven mechanism for orienting said cups and delivering them to said chute all facing the same direction.

A further object of the invention is the provision, in a cup finishing machine, of novel means for automatically receiving cups one at a time from a feeding chute, successively clamping said cups in a holding member, advancing each clamped cup along a predetermined path and into engagement with a finishing tool.

Other objects and advantages of our invention will be apparent to those skilled in the art, upon a study of the following specification.

In the accompanying drawings given by way of example to illustrate the invention, like numerals in the several figures represent the same parts, and

Figure 1 is a side elevation of our new and improved cup trimming or finishing machine;

Figure 2 is a plan view of the machine shown in Figure 1;

Figure 3 is an enlarged plan view of the mechanism for receiving the cups from the feeding device and presenting them to the finishing tool, one cup being shown engaged by the tool and a second cup in position to be delivered to said mechanism on the next succeeding machine cycle;

Figure 4 is a sectional elevation as seen along the lines 4—4 of Figure 3;

Figure 5 is an enlarged plan view similar to Figure 3, with the exception that the parts are in different positions and the second cup (shown in Figure 3) is positioned to be advanced toward the finishing tool;

Figure 6 is an elevation of our chuck member for holding the cups while the finishing operation is performed thereon;

Figure 7 is a perspective view, exploded and showing the elements forming the chuck member;

Figure 8 is a sectional view of one arrangement of the members for clamping and releasing cups in the chuck member, said first members being shown in the "releasing" position;

2

Figure 9 is a sectional view of the members shown in Figure 8, said members having been moved to the "clamping" position;

Figure 10 is a sectional elevation of a portion of the hopper showing how the cups are "oriented";

Figure 11 is an enlarged, detail view of the crosshead engaging lever; and

Figure 12 is a plan view of the "star" wheel for feeding cups to the feeding chute.

The machine operates cyclicly, receiving a cup, finishing it, and discharging it—during each cycle. A discharge chute is provided to receive the finished cups and to deliver them to a suitable container therebelow. An elevated hopper on the machine is provided for receiving the cups to be finished and it orients said cups and delivers them to a feed chute which in turn delivers them to the mechanism below. All the operator has to do is to pour cups to be finished into the hopper and see that the container of finished cups does not run over. Since a hopper full of cups will supply the machine for some time, one operator can keep several of the machines going at one time.

The machine includes, referring to Figures 1 and 2, a table top 10, mounted on legs 11 and 12. Between the top 10 and the floor is a shelf 13, also supported by the legs 11 and 12, and forming a support for the driving motors 14 and 15 and the reduction gear 16.

The driving motor 14 carries a pulley 17 which is connected by means of a belt 18 to a pulley 19 carried on the spindle 20 of a spindle head 21 mounted on the table top 10. A finishing tool 22 is driven by the spindle 20, and although this tool is shown in the drawings, by way of example, as a milling cutter; it will be understood that it may be of other forms in accordance with the particular operation to be performed on the cups or other cavity bearing bodies handled in the machine.

The motor 15 carries a pulley 23 which is connected by a belt 24 to a pulley 25 carried on a shaft 26 of the gear reduction unit 16. A longitudinal shaft 27 in the gear reduction 16 projects through opposite ends of the casing thereof. On one end of the shaft 27 is secured a crank 28 which defines the cyclic operation of the machine, as will presently be described.

The opposite end of the shaft 27 has secured thereto a pulley 29 which is connected, by means of a belt 30, to a pulley 31. Since the pulley 31 is in a plane angular with respect to the axis of the shaft 27, idler pulley 32 and 33 are pro-

vided for guiding the belt from one plane to the other. The pulley 31 drives mechanism for orienting the parts to be finished by the machine.

A stud shaft 153 is adjustably carried on an upright member 154 secured to the table 10 and suitably braced by a bracing member 155.

A supporting member has an upright portion 34 the lower end of which is secured to a block member 35 mounted on the table 10. The upper end 36 of the supporting member is angular with respect to said upright portion, and a curved portion 37 therebetween is suitably braced by means of a web 38.

A base 39 for the material hopper 40 is carried on the upper portion 36 above referred to, and this base includes a bearing boss 41 for the agitator shaft 42. The lower end of the agitator shaft has pulleys 31 and 31*a* positively secured thereto. The pulley 31 is engaged by the belt 30, as has already been described, and the pulley 31*a* is smaller in diameter and is connected by a belt 43 to a pulley 44 which is positively secured to a shaft 45 which is also journaled in the base 39. The upper end of the shaft carries a star cam 46 the purpose of which will be presently described.

The hopper 40 is mounted on the base 39 and has an open end 47 through which primer cups or the like may be poured into the hopper. The base 39 has an extended portion 48 which is hollowed out to a depth equal to the height of the cups plus clearance and forms a chamber 50 for receiving said cups after they have been oriented as will be presently described. A transparent cover 49 on the chamber permits the movement of the cups to be observed.

Within the bottom of the hopper 40 and mounted on the upper end of the shaft 42 is an agitator disc 51 which is rotated when the pulley 31 is driven by the belt 30. The agitator disc (see Figure 10) has a plurality of slots 52 formed therein. The bottom of the hopper wall has a plurality of notches or teeth 53 formed therein of such width that the interior of the cups may form a "sloppy" fit thereon, and the spaces 54 between these teeth are a little less than the outside diameter of the cups, so that it is impossible for said cups to pass through. As the agitator disc rotates, it keeps stirring up the cups and any cups with the closed ends up cannot get through the spaces 54 and enter the chamber 50, however the interiors of any cups with the open ends up (as may be seen in Figure 10) engage the notches or the teeth 53 and are "kicked out" into the chamber 50 by the slot 52 in which the cap lies, and since the depth of the chamber is less than the caps across corners, it is impossible for the caps to turn over therein.

The star wheel 46 is positioned in the lower end of the chamber 50, and due to the fact that the chamber is inclined, the cups all gravitate to said lower end and are singly engaged by said star wheel.

Formed in the supporting member 34, 37, 36 is a column for the cups, the upper end of which communicates with the discharge side of the star wheel, and the lower end of which communicates with the feed cavity 56, shown in Figure 3.

The crank 26, Figures 1 and 2 has been previously referred to as defining the cyclic operations of the machine. This crank is keyed to the shaft 27, and has the lower end of a connecting rod 57 connected thereto. The upper end of the connecting rod is bifurcated to form a yoke 58 having portions 58*a* and 58*b* spaced apart from each other. A pin 59 is mounted in aligned holes formed in 58*a* and 58*b*. A boss 60 is secured to the table 10 and has a pair of spaced slots formed therein into which are mounted the ends of a pair of equal link members 62 and 63, and a pivot pin 61 extends through a cross hole in the block 60 and forms a pivot pin engaged by suitable bearing holes in the right ends of said link members. The left ends of the link members 62 and 63, have bearing holes therein engaging the pin 59 adjacent to the yoke 58*a* and 58*b*.

Between the link members 62 and 63, and also connected to the pin 59 is the right end of a link member 65. A block member 66 is also mounted on the table 10 and has a bore therein in which a shaft 67 is reciprocatively carried. The right end of the shaft 67 is slotted to accommodate the left end of the link 65, and a pivot pin 68 extends through holes in the slotted portion of the shaft and the end of said link.

The throw of the crank is so proportioned that when it is in its extreme upward position (as shown in Figure 1) the shaft 67 has moved its extreme distance to the right, and when the crank moves a half revolution or 180° from the position shown in Figure 1, the links 62, 63 and 65 move to a horizontal position, thus in turn moving the shaft 67 to its extreme position toward the left. From this it will be seen that as the crank 28 turns it causes the shaft 67 to reciprocate in the block 66.

The shaft 67, Figures 3, 4 and 5 has a portion 69 of reduced diameter to which is secured a collar 70, the function of which will presently be described. The end portion 72 of the shaft 67 functions as a cam, as will be described.

The block 66 has a slot 71 formed therein to accommodate a lever 73. A shaft 74 extends through aligned holes in the block 66 and through a corresponding hole in the lever 73. Spring means 75 urges the lever 73 in a counterclockwise direction as seen in Figure 4, and the function of this lever will be presently described.

A base member 76 is secured to the table 10 in any suitable manner and has a hole 77 therein, in alignment with the axis of the shaft 67. The shaft portion 69 forms a working fit with and reciprocates in said hole in time with the reciprocation of the shaft 67 in the block 66. Concentric with the hole 77 is formed a clearance cavity 78 which accommodates the collar 70 when the shaft portion 69 is moving to the left end of its path of travel.

The feed cavity 56, described above as being at the lower end of the feed column 55, is formed in the base member 76, closely adjacent to, and communicating with the hole 77. The feed cavity 56 preferably is one end of a slot 79 milled in the base 76 at a right angle to the hole 77. Reciprocatively mounted in the slot 79 is a bar member 90 which has a cross-slot 91 formed therein and engaged by a lever 92 forming a part of a feed control member 93 which will be presently described.

A projecting arm 94 on the lower end of the feed column 34 may be secured to the base 76 by means of screws 95 and when so secured, the feed column 55 therein is in position to deliver cups one by one to the feed cavity 56. A removable plate 96 on the feed column, when removed, gives access to the interior of the feed column

and also to the feed chamber. The method of feeding will also be presently described.

The base 76 has a hole 97 formed therein spaced apart from and parallel to the hole 77, and a boss member 98, suitably secured to the table 10 in spaced relation to the base 76, has a hole 99 formed therein in alignment with the hole 97 so that a rod 100 may reciprocate therein. The base 76 also has a hole 101 spaced apart from and parallel to the hole 77, and a second boss member 102 (similar to the boss 98) suitably secured to the table in spaced relation the base 76 has a hole 103 formed therein in alignment with the hole 101 so that a rod 104 may reciprocate therein.

A cross bar 105 has a hole 106 therein which forms a working fit on the shaft portion 69, and spaced apart therefrom are holes 107 and 108 which respectively form press fits on the ends of the rods 100 and 104 and the bar 105 is secured to these rods respectively by means of taper pins 109 and 110. The bar 105 also has threaded holes carrying bolts 111 and 112 provided respectively with lock-nuts 111' and 112'.

A second bar member 115, which may also be seen in Figures 6 and 7, has spaced holes 116 and 117 formed therein which respectively fit the rods 100 and 104 and said bar member is fixedly secured to these rods a predetermined distance from the bar 105 by means of set-screws 118 and 119, thus forming a cross-head.

The bar member 115 has a cut out portion 120 at one end and a second cut out portion 121 at the other end, and studs 122 and 123 have their lower ends mounted in holes in said cut out portions and secured therein by set-screws 124 and 125 respectively and carry threads 126 and 127 on their upper ends. A lever 128 has a hole therein forming a working fit on the stud 123, and a second lever 129 is similarly mounted on the stud 122. Each lever has hemispherical holes 130 formed in the upper surfaces thereof to accommodate steel balls 131.

A bar member 132 carries holes 133 and 134 which form working fits on the studs 122 and 123 respectively, and carries hemispherical holes 135 which are also adapted to engage the steel balls 131 under conditions to be presently described. The bar 132 has a slot 136 formed therein, and holes 137 and 138 are within the slot.

The bar member 115 has a slot 139 formed therein which matches the slot 136 when the bar 132 is placed on the studs 122 and 123. Short studs 140 and 141 are mounted in the bar 115 within the slot 139 so that they engage the holes 137 and 138 respectively.

Matching bearing members 142 and 143 are provided with holes which engage the studs 140 and 141, and are of such length that they form a fit within the slots 139 and 136 respectively. A semi-circular groove 144 is formed in the member 142 and this groove has a stepped portion 145. An identical semi-circular groove 144*a* is formed in the member 143 and has a stepped portion 145*a*. When the two members are together in the slots 136 and 139, as described above, the semi-circular grooves match and receive the shank of a bushing 146, and the stepped portions 145*a* receive the shoulder 147 of said bushing. A diagonal slot 148 formed in the bushing permits the bushing to clamp the cups, under conditions to be presently explained, without scarring them.

With the bushing between the members 142 and 143, the latter are mounted on the studs 140 and 141, and with the levers 128 and 129 positioned on the studs 123 and 122 and carrying the balls 131, the bar member 132 is applied as shown in Figures 4 and 6. Then springs 149 and 150 are applied to the studs 122 and 123, and nuts 151 and 152 respectively engage the threaded ends 124 and 125 thereof for adjusting the tension of the springs. This assembly forms a chuck for holding the cups while they are being finished. The tension of the springs causes the bushing 146 to contract and firmly hold the work—when the levers 128 and 129 are in such position that the balls 131 are embraced by the hemispherical holes in the levers and the hemispherical holes in the bar 132.

When the levers 128 and 129 are moved to such positions that the balls 131 are moved away from the hemispherical holes 135 in the bar 132, the balls encounter imperforate portions of the bar, causing the latter to move upwardly against the urge of the springs and this in turn permits the bushing to expand to its original diameter, with the result that the work (cup) is free and may be discharged therefrom in a manner to be presently described.

A plate 156 secured to the table supports upright studs 157 and 158, and the lever 128 is positioned between these studs. Likewise the lever 129 is positioned between upright studs 160 and 161 supported by a plate 159 secured to the table.

The feed control member 93 is mounted on a stud shaft 162, mounted on the table 10, and is provided with a lever 92 already described, and additional actuating arms 163 and 164 with a space 165 therebetween. This space is so proportioned that the cross-head bar 105 may make its full stroke both forward (towards the left as seen in Figure 3) and back (toward the right). As the bar 105 approaches its forward limit, it engages the actuating arm 163 and causes the member 93 to move in a counter-clockwise direction and thus, and through the medium of its lever 92, the bar member 90 is retracted. When the bar 105 moves to the right and approaches the limit of movement it engages the actuating arm 164 and moves the member 93 in a clockwise direction and in turn causes the bar member 90 to advance and discharge a cup from the feed cavity 56 to the position in front of the shaft portion 69 shown in Figure 5.

The lever 73, as may be seen in Figure 11 is mounted in a slot in the block 66, wherein the clearance space 166 between the lever and the block limits the downward movement of the lever.

A slot or notch 167 formed in the lever 73 with slightly angular sides 168 and 168*a*. The side 168*a* projects below the lever and is provided with a camming surface 169 adapted to act with the end 72 of the shaft 67.

As the shaft 67 moves to the right, the collar 70 on the shaft 69 moves the cross-head bar 105 and moves it to the position, shown in Figure 11 and Figure 5, where the bar 105 is engaged by the notch 167. As the shaft 67 and 69 moves to the left the cross-head remains stationary until the end 72 of the shaft 67 engages the surface 169 and causes the lever to rise to a position where its notch 167 is completely disengaged from the bar 105—then, as the end 72 engages said bar, the cross-head is moved to the left to a point where the screws 111 and 112 (Figure 3) abut the base member 76. (This movement is effected when the levers 63 and 65—Figure 1—have been moved down until their axes are substantially in alignment, or lie on the "infinite" plane.)

The primer cup has, by this movement, been

brought forward into engagement with and finished off by the tool 22. The movement of the cross-head, due to the fact that the levers 128 and 129 are restrained by the studs 158 and 161, effects the clamping of the cup in the bushing 146, and the cup is "backed up" by the end of the shaft 69.

The crank 28 then starts moving the connected ends of the levers 63 and 65 upwardly, causing the shaft 67, 69 to move to the right as seen in Figure 3. By the time the collar 70 engages the bar 105, the end of the shaft has left the bushing and the end of the cup therein. As the collar 70 continues to move the bar 105 to the right, a point is reached where the bar is engaged by the notch in the lever 73 and the end of the shaft 69 assumes the position shown in Figure 5. The bar 105 has by this time actuated the arm 164 and has caused the bar 90 to shoot the next cup from the cavity 56 (Figure 3) to the position in front of shaft 69 shown in Figure 5.

At the same time the levers 128 and 129 have been restrained by the studs 157 and 160, causing the balls 131 to encounter solid portions of the bar and releasing the finished cup positioned in the bushing 146. The finished cup, however, remains freely in position in the bushing until encountered by the next cup (which has just been placed in front of the end of the shaft 69 by the bar 90) when the shafts 67 and 69 again move to the left. The finished cup is therefore pushed out by, and its place taken by, the succeeding cup, and further movement to the left effects the clamping of the latter therein, the retraction of the bar 90, permitting another cup to pass into the cavity 56, and the feeding of the open end of the cup against the tool 22.

As the finished cups are pushed out in the manner described, they fall through an opening in the table 10, onto a chute 170, and thence into a suitable bin or container 171.

Although we have herein shown and described by way of example the best embodiment of the invention now known to us, it is obvious that many changes may be made in the arrangements herein shown and described without departing from the spirit of the invention.

We claim:

1. In a machine for finishing the ends of drawn cups or shells, a support, a finishing tool carried on said support, and means for driving the same, a work holder reciprocatively movable on said support toward and away from said tool, mechanism for moving said work holder including serially arranged linkages one end of which is connected to a cross-head carrying said work holder and the other end of which is connected to said support, an intermediate pivotal connection between the linkages moved upwardly to move the work holder away from said tool and adapted to be moved to the infinite plane as work in said holder is engaged by said tool, and settable stops associated with said work holder for positively limiting the movement of said work holder in the direction of said tool.

2. In a machine for finishing the ends of cups or shells, a support, a finishing tool mounted on said support, driving means for said tool, a guideway mounted on said support, a cross-head reciprocally carried on said guideway and including a work holder, a pushrod movably carried on said support and means for reciprocating the same, said pushrod carrying a pair of spaced engaging members, one adapted to engage and drive said cross-head when said pushrod is moving one direction and the other adapted to engage and drive said cross-head in an opposite direction when said pushrod is moving in its other direction, the space between said engaging members defining a period in which said cross-head remains motionless, and means for feeding a cup to said work holder during said period.

3. In a machine for automatically finishing the ends of priming cups and the like, a hopper adapted to receive a quantity of said cups, a configurated plate in the bottom of said hopper and having its axis slightly inclined from the vertical, means for rotating said plate, a plurality of spaced notches formed in the bottom edge of the wall of said hopper, whereby only up-ended cups lying in the configurations of said plate may pass laterally from said hopper, a chute having its upper end positioned to receive said cups passing laterally from said hopper, a work holder, feeding means for individually feeding said cups from said chute to said holder, a finishing tool and means for driving the same at a constant rate of speed, means for advancing said work holder to bring work in said holder into engagement with said tool and thence for withdrawing said holder to a position for receiving a succeeding cup, and means for discharging the finished cup from said holder to make way for said succeeding cup.

4. In a machine for automatically finishing the ends of priming cups and the like, a hopper adapted to receive a quantity of said cups, a configurated plate in the bottom of said hopper and having its axis slightly inclined from the vertical, means for rotating said plate, a plurality of spaced notches formed in the bottom edge of the wall of said hopper, whereby only up-ended cups lying in the configurations of said plate may pass laterally from said hopper, an inclined chamber adjacent to said notches for receiving said cups passing laterally from said hopper a chute having its upper end connected to said chamber for receiving oriented cups therefrom, a star wheel between said inclined chamber and the upper end of said chute, a work holder, feeding means for individually feeding said cups from said chute to said holder, a finishing tool and means for driving the same at a constant rate of speed, means for advancing said work holder to bring the end of the work in said holder into engagement with the end of said tool and thence for withdrawing said holder to a position for receiving a succeeding cup, settable stop means adapted to be engaged by said holder to limit the movement of the same towards said tool, and means for discharging the finished cup from said holder to make way for said succeeding cup.

5. A machine according to claim 2, in which said means for feeding a cup to said work holder is comprised of a cam controlled plunger which when retracted provides space to receive a cup from a supply of the same, and which when advanced, projects said cup into said work holder, and with the further feature of cam means pivotally supported on said machine and having spaced engaging arms, one of which when engaged by the cross-head moving in one of said directions, retracts said plunger, and the other of which when engaged by the cross-head moving in the opposite direction advances said plunger.

6. In a machine for finishing the ends of drawn cups or shells, a support, a finishing tool carried on said support and having its axis on a horizontal plane, means for driving said tool, a work

holder, a cross-head supporting said work holder and movable endwise on said support toward and away from the end of said tool, mechanism for moving said work holder including serially arranged linkages one end of which is connected to said cross-head and the other end of which is connected to said support, said linkages including an intermediate pivotal connection adapted to move upwardly to move said holder away from said tool and adapted to be moved downwardly as work in said holder is to be engaged by said tool, settable stops for limiting the movement of said cross head at least in the direction of said tool, and means for applying driving power to said cross-head solely via said intermediate pivotal connection.

HERBERT P. ECK.
MARTIN M. KARLAN.
COSIMO PERRUCCI.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
500,511	Richards	June 27, 1893
579,357	Brown	Mar. 23, 1897
636,911	Mergenthaler	Nov. 14, 1899
993,158	Einfeldt	May 23, 1911
1,435,035	Walroden	Nov. 7, 1922
1,632,852	Richter	June 21, 1927
1,691,825	Pruitt	Nov. 13, 1928
1,945,276	Kahl	Jan. 30, 1934
1,968,840	Linn	Aug. 7, 1934
2,063,339	Probach	Dec. 8, 1936
2,082,929	Yager et al	June 8, 1937
2,176,608	Marsilius	Oct. 17, 1939
2,359,931	Moffitt	Oct. 10, 1944