Aug. 27, 1946. W. S. REYNOLDS 2,406,562

TRIMMING MACHINE

Filed May 6, 1944 4 Sheets-Sheet 1

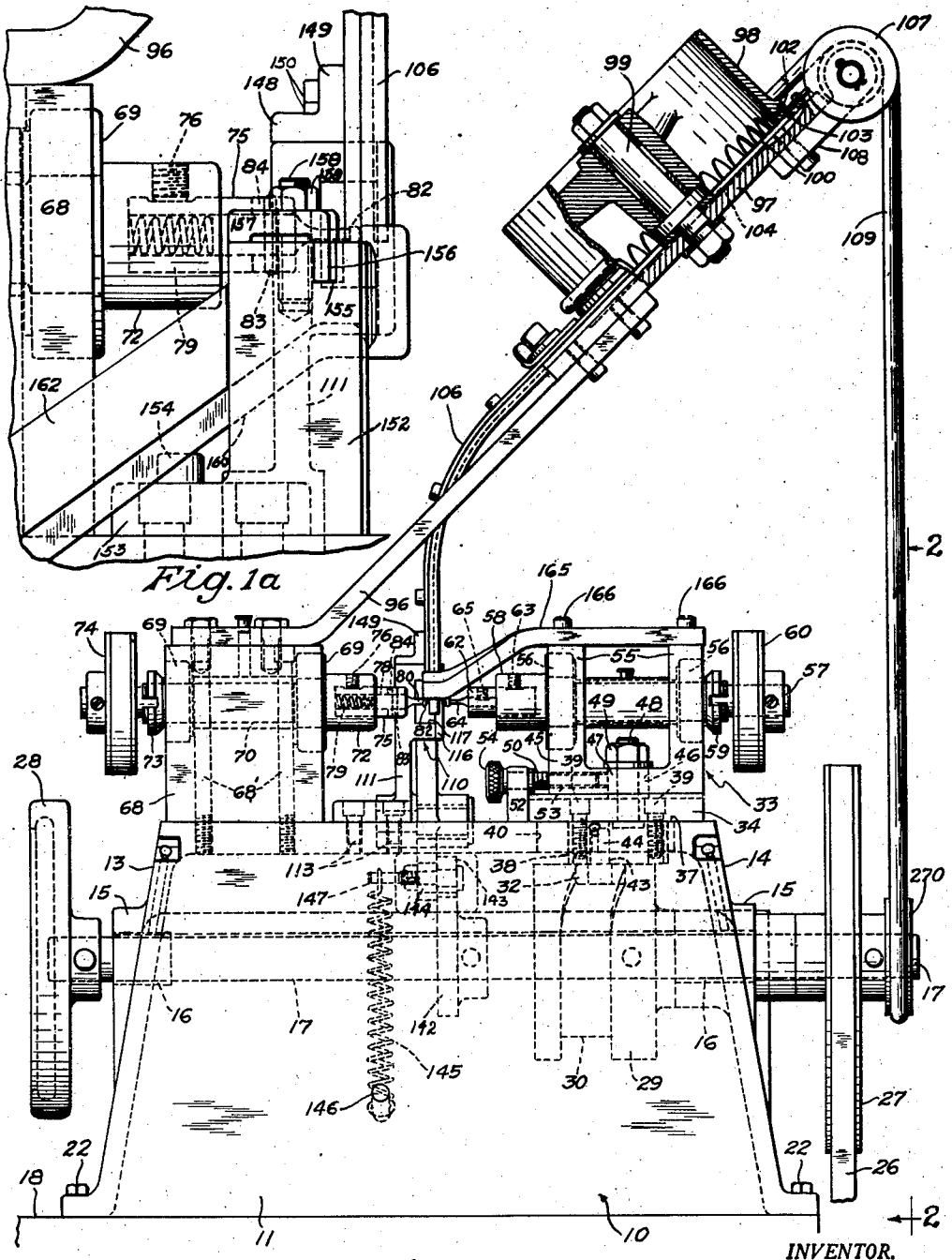


Fig. 1

Fig. 1a

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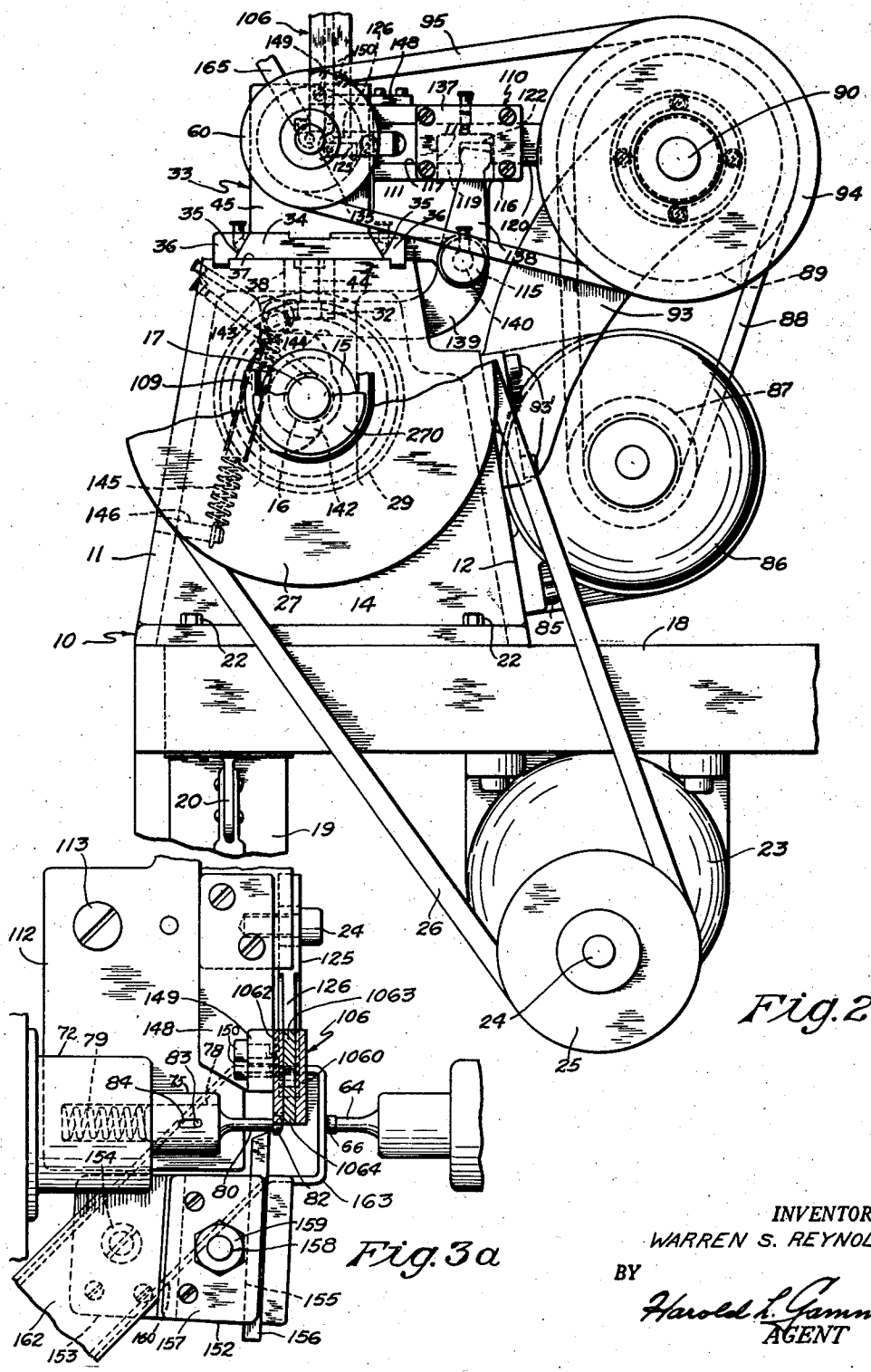


Fig. 2

Fig. 3a

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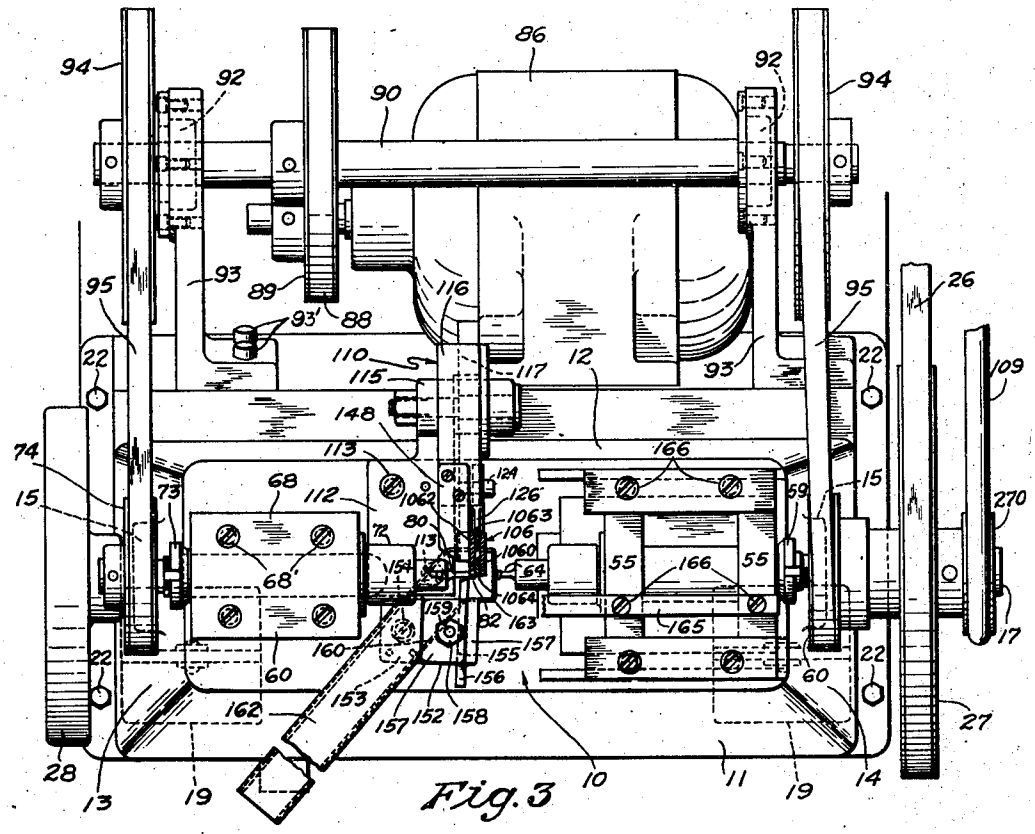


Fig. 3

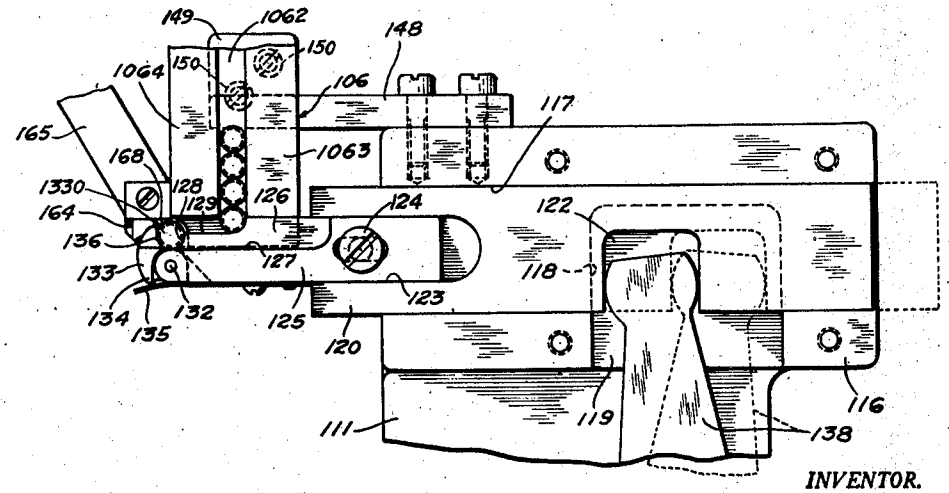


Fig. 4

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TRIMMING MACHINE

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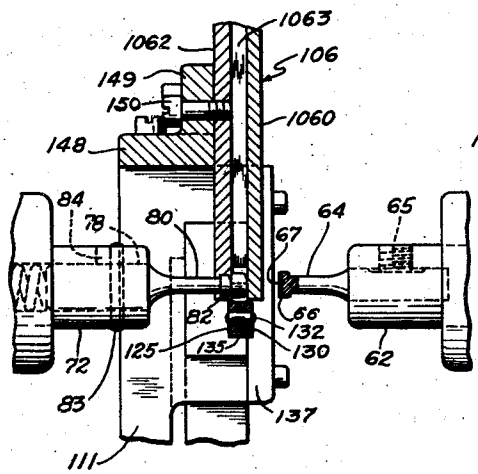


Fig. 5

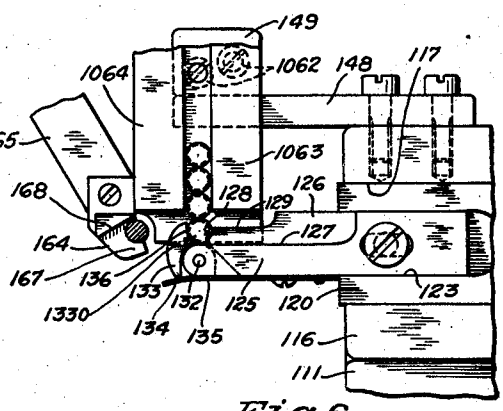


Fig. 6

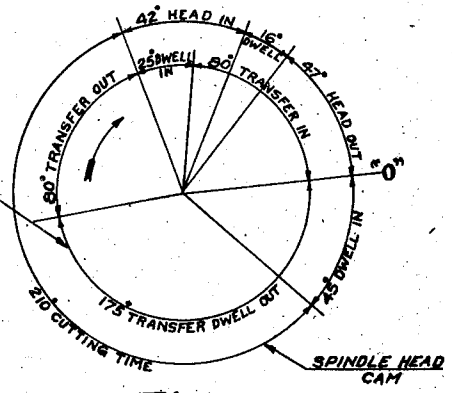


Fig. 9

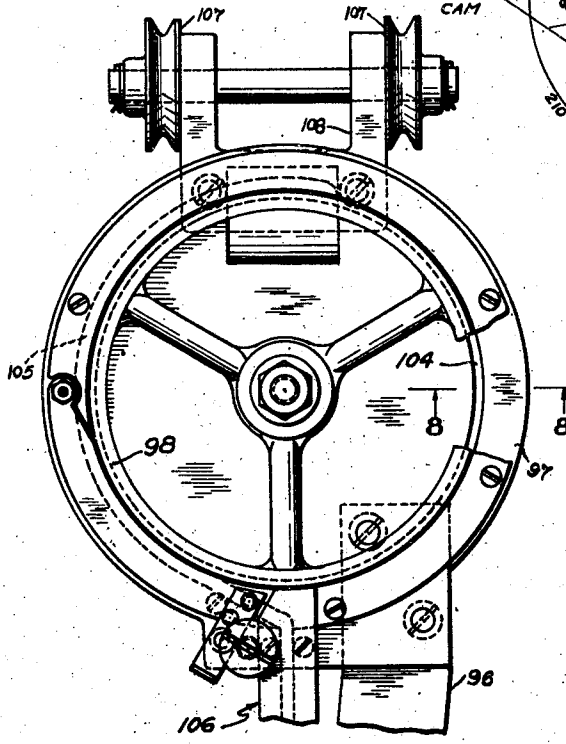


Fig. 7

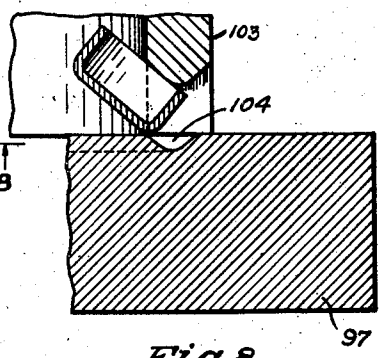


Fig. 8

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2,406,562

UNITED STATES PATENT OFFICE

2,406,562

TRIMMING MACHINE

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Application May 6, 1944, Serial No. 534,509

6 Claims. (Cl. 82—2)

1

The present invention relates to a trimming machine, and, more especially, to an improved machine for trimming ammunition components such as primer cups and elements of similar shape.

In general, percussion caps or detonators comprise metal cup-shaped members containing an anvil and explosion initiating agents, the latter being very sensitive to shock and friction so that they can be readily brought to ignition by such means.

Percussion caps or primers are widely used in small arms ammunition for igniting the propellent powder in a cartridge case, the ignition of which develops a relatively well sustained but not excessive pressure on the base of the projectile. The primer is seated in a pocket in the head of a cartridge case and must be made accurately to diameter to prevent an escape of gas between the cup and the walls of its pocket, such escape being known as "blow back" when the cartridge is fired. Moreover, the head of the cup must be sufficiently thick so that it will not be punctured by a firing pin. The outside of the cup head must be a predetermined depth below the face of the shell head, and to insure proper transmission of the firing pin blow, the primer cup mouth must seat on the base of the primer pocket, hence in manufacture the height of the cup must be accurately controlled.

The present invention relates to a new and improved means for trimming primer cups or similar articles to a predetermined overall length within a tolerance of not over .001 inch from cup to cup or in different parts of the circumference of any cup, whereby all cups will seat firmly and securely on the bottoms of their pockets and at the same time pass depth gauge inspection.

An object of the invention is to provide a means for supporting and trimming a primer cup. A further object is to provide improved means for supporting a primer cup and moving the cup into engagement with trimming means. A further object is to trim a primer cup by supporting and rotating the cup frictionally between two rapidly revolving spindles and moving the rapidly revolving cup into engagement with the fixed cutter blade. A still further object is to trim a primer cup to a predetermined overall length by supporting the cup on a resiliently mounted spindle and engaging the head of the cup by a second spindle which moves the cup a predetermined distance with respect to a fixed cutter blade.

These and other objects, features and advantages of the invention will be more fully described in the following specification which is descriptive of the exemplary embodiment of the invention illustrated in the accompanying drawings.

2

It will be understood, however, that the invention is not limited to the particular embodiment shown or to the specific use described, but is comprehensive of all modifications thereof within the scope of the appended claims.

In the drawings:

Fig. 1 is a front elevation of the primer cup trimming machine including the hopper but with the tool holder removed.

Fig. 1*a* is an enlarged fragmentary front elevation of the tool holder and discharge chute.

Fig. 2 is an end elevation in the direction of lines 2—2 of Fig. 1.

Fig. 3 is a plan view of the trimming machine of Fig. 1 including the tool holder and discharge chute.

Fig. 3*a* is an enlarged fragmentary plan view of the spindles, cutting tool, hopper chute and feed means.

Fig. 4 is an enlarged fragmentary side elevation of the primer cup transfer means including the hopper chute and the stripper, the transfer jaw being in its advanced position.

Fig. 5 is an enlarged fragmentary front elevation partly in section of the transfer means, hopper chute and stripper shown in Fig. 4.

Fig. 6 is similar to Fig. 4, but with the transfer jaw in its normal or retracted position.

Fig. 7 is a plan view of the hopper.

Fig. 8 is a section on line 8—8 of Fig. 7.

Fig. 9 is a timing diagram of the cycles of operation of the feed spindle and cup transfer jaw.

Referring to the drawings, the trimming machine of this invention comprises a base 10 which in the present embodiment is a casting having substantially the shape of a truncated rectangular pyramid provided with front and rear faces 11 and 12 respectively and ends 13 and 14. Each end is provided with an apertured boss 15 for a bearing 16 which are adapted to rotatably support opposite ends of a main drive shaft 17. The base 10 is mounted on the top 18 of a substantially rectangular table comprising vertical legs 19 rigidly held in assembled relationship by suitable braces 20, the base 10 being fastened to the table top 18 by bolts 22 or other suitable fastening means.

Fixedly secured beneath the table top 18 is a main drive geared head motor 23 which, in the present embodiment, is of one-third horse power and turns up 1725 R. P. M. with a co-shaft speed

of 280 R. P. M. The co-shaft 24 carries a pulley 25 which is connected by a belt 26 to a drive pulley 27. The latter has a pitch diameter of substantially nine and one-half inches and is secured on that end of the main drive shaft 17 which extends beyond the adjacent end 14 of the base 10. A second pulley 270 is also fastened on this end of the shaft 17 and is adapted to drive a hopper as hereinafter described. The opposite end of the main drive shaft 17 carries a fly wheel 28 which is designed to facilitate manual rotation of the main drive shaft for making adjustments of the spindles and transfer means.

Keyed to the main drive shaft 17 within the base 10 is a drum cam 29 having a peripheral cam groove 30 designed to receive the cam follower or roll 32 of a reciprocable head stock, indicated generally at 33. The latter comprises a carriage plate 34 having parallel bevelled edges 35 adapted to slidingly engage beneath the cooperating bevelled edges of suitable guides 36 which are fixedly secured in spaced parallel relationship on the top surface or bed 37 of the base 10. An oil cup may be inserted in each guide 36 and connected by a suitable passage to the bevelled edges 35 of the carriage plate 34 to provide lubrication therefor. The bed 37 of the base 10 is scraped or otherwise smoothly finished to provide a surface on which the carriage plate 34 may reciprocate.

To this end a substantially rectangular boss 38 is provided which is secured by bolts 39 or other fastening means to the underside of the carriage plate 34 and is adapted to project down through a substantially rectangular aperture 40 in the bed 37. The engaging surfaces or walls of the boss 38 and the aperture 40 may be lubricated by suitable oil cups and connecting oil passages. The boss 38 is provided with a substantially vertical aperture 43 in the underside thereof adapted to receive the stem 44 of the cam roll or follower 32, the stem 44 being secured in the aperture 43 by a force fit or other suitable securing means. Thus, as the drum cam 29 is rotated by rotation of the main drive shaft 17, the cam follower 32 slides the carriage plate 34 back and forth on the bed 37 of the base 10. The length of its stroke, as determined by the configuration of the cam groove 30 of the drum 29 of the present embodiment is substantially five-sixteenths of an inch.

Adjustably mounted on top of the carriage plate 34 is the head stock per se comprising the U-shaped block 45 having a longitudinal slot 46 in its foot 47 to receive a bolt 48. The latter is suitably secured at its lower end to the carriage plate 34 and extends upwardly substantially vertically through the slot 46 of the foot 47. A nut 49 and washer are provided for securing the U-shaped block 45 to the carriage plate 34. By loosening the nut 49, the block 45 is freed to be moved longitudinally relative to the carriage. This adjustment is accomplished by means of a screw 50 which is rotatably supported by a bracket 52 on the front end of the carriage and threadedly engaged in a tapped hole 53 in the foot 47 of the head stock block 45. A knurled head 54 on the screw 50 is provided to facilitate manual adjustment.

The vertical uprights 55 of the head stock block are each provided with axially aligned apertures to receive bearings 56 for rotatably supporting a spindle drive shaft 57 substantially parallel to the bed 37 of the base 10. The shaft 57 has an upset head 58 at its inner end and

is provided with a screw threaded collar 59 at its outer or opposite end, whereby the shaft is secured against longitudinal movement in its bearings 56. A pulley 60 is fastened to the right-hand end of the shaft 57, see Fig. 1, to drive the latter as hereinafter described.

At its opposite end of the shaft, the head 58 is apertured on its longitudinal axis to receive a bushing 62 which is secured in the aperture by a set screw 63 or other suitable fastening means. The bushing 62 is adapted to receive a spindle 64 which may be fastened in the bushing by a set screw 65, the end of the spindle being upset to provide a rim 66 and a face 67, see Fig. 5, which is made slightly concave and polished so as to make a nice fit with the head of a primer cup to be trimmed. As the head stock is moved forwardly on its bed, the spindle 64, hereinafter termed the cup feeding spindle, is adapted to engage a cup and move it onto a second spindle as described below.

As shown in Fig. 1, a substantially solid rectangular bearing block 68 is fastened by bolts 68' on the opposite end of the bed 37 and is provided with a longitudinal aperture to receive a pair of bearings 69. The latter are located at opposite ends of the aperture of the block 68 and are in axial alignment with the spindle drive shaft 57. Rotatably mounted in the bearings 69 is a second spindle drive shaft 70 which is provided with an upset head 72 at its inner end and a screw threaded collar 73 at its opposite end for securing the shaft 70 against longitudinal displacement in its bearings 69. The outer or left-hand end of the shaft 70, see Fig. 1, has a pulley 74 fastened thereto, the pitch diameter of which is equal to that of the pulley 60. The head 72 is provided with an axial aperture to receive a bushing 75 which is held in the aperture by a set screw 76.

Resiliently mounted in the bushing 75 is a second spindle comprising a relatively large shoulder portion 78 adapted to make a smooth sliding fit in the aperture of the bushing and to abut the end of a coil spring 79 seated therein; and a shank portion 80 of reduced diameter having a button 82 at the end thereof, the diameter and configuration of which correspond closely to the corresponding measurements of the inside of a primer cup whereby a cup may seat tightly thereon.

The second spindle 80, hereinafter termed the cup supporting spindle, is held in its bushing against the force of the coil spring 79 by means of a transverse pin 83 secured in the shoulder portion 78 of the spindle, the ends of the pin 83 being adapted to extend into longitudinal slots 84 formed on diametrically opposite sides of the bushing 75. The length of each slot 84 is such as to enable limited displacement of the spindle 80 in its bushing.

Referring to Figs. 2 and 3 secured on the back face 12 of the base 10 by bolts 85 is a spindle drive motor 86 which, in the present embodiment, comprises a one-half horse power squirrel cage A. C. motor turning up 3450 R. P. M. The motor is provided with a pulley 87 of substantially three inch pitch diameter which is connected by a belt 88 to a pulley 89 of substantially six inch pitch diameter carried on a jack shaft 90. The latter is rotatably supported at its opposite ends in suitable bearings 92 of a pair of rearwardly extending brackets 93 secured by bolts 93' to the back of the base 10. Secured at each end of the jack shaft 90 is a pulley 94, each of substantially seven inch pitch diameter and connected by a

belt 95 to one of the above described spindle pulleys 60 and 74 respectively. In accordance with this construction, each spindle will be driven by the motor 86 at substantially the same speed.

Bolted to the top of the fixed bearing block 68 is a bracket 96 which is bent upwardly at an angle to the vertical and supports a circular plate 97 at its upper end comprising a hopper bottom.

As shown in Figs. 7 and 8, the hopper per se is of the type described and illustrated in the Butler patent, No. 774,827, November 15, 1904, and comprises briefly a drum 98 rotatably mounted upon an axle 99 which is secured in the geometrical center of the hopper bottom 97 substantially vertical to the plane thereof. The lower edge 100 of the drum 98 is serrated and spaced above the surface of the hopper bottom 97 a predetermined distance; and secured on the outer periphery of the drum adjacent its lower edge is a supplementary segregating ring member 102, the lower edge 103 of which is adapted to ride on the surface of the hopper bottom and is provided with suitably shaped apertures to enable properly oriented primer cups to escape from the hopper as more fully described in the aforementioned patent. The cups are automatically fed through the apertures of the ring 102 by rotating the drum 98, the rotation of which is effected by means of a belt and pulley drive. To this end, a pair of spaced parallel pulleys 107 are supported by means of a bracket 108 on the upper edge of the hopper bottom 97. A continuous belt 109 is provided which encircles the drum 98 and passes over the pulleys 107 and is driven by the pulley 270 of the main drive shaft 17.

To facilitate the passage of the properly oriented cups through the apertures of the segregating ring 102, a relatively shallow circular groove 104 is formed in the hopper bottom, see Figs. 7 and 8, directly beneath the lower edge 103 of the ring. The depth of the circular groove is not enough to enable improperly oriented cups to escape beneath the lower edge of the segregating ring, but facilitates the passage of properly oriented cups, and hence insures more rapid and dependable delivery of cups to the trimming means. The properly oriented cups are collected on the outer edge of the hopper bottom by means of a suitable circumferential closed passage, indicated generally at 105, having an opening in the periphery thereof to enable the cups to flow downwardly therefrom into a tube 106 by which the cups are delivered to a suitable transfer means. Referring to Figs. 5 and 6, the delivery tube 106 comprises two face plates 1060 and 1062 which are held apart by a pair of substantially parallel longitudinal spacers 1063 and 1064 which, with the face plates, form an enclosed passage for the primer cups.

The transfer means is shown generally at 110 in Figs. 1 and 2 and in detail in Figs. 4, 5 and 6, and embodies a bracket member 111 having a substantially rectangular foot portion 112 which is secured by a pair of bolts 113 to the rear edge of the bed 37 at substantially the center thereof. The bracket member 111 is provided with an apertured boss 115 at its lower rearward edge to receiver a pivot pin for the purpose hereinafter described. The upper portion of the bracket is relatively thick and constitutes a block 116 having a rectangular horizontally disposed guide groove 117 in its outer face running the full length of the block 116. Intersecting the groove 117 adjacent the rear end thereof is a substantially rectangular aperture 118 which cuts through the lower edge of the groove 117 and forms a depression 119 in the vertical wall thereof.

Slidably mounted in the groove 117 is a substantially rectangular slide 120 having a rectangular aperture 122 in its lower edge and provided at its forward end with a substantially rectangular recess 123 milled or otherwise formed in the outer face thereof. Secured in the recess 123 by a bolt 124 is a transfer finger 125, the forward end of which extends beyond the forward end of the slide 120. Substantially the upper half of the forward end of the transfer finger 125 is milled or otherwise formed with a relatively thin upstanding rib 126 having horizontally disposed shoulders 127 on opposite sides of the finger. The end of the rib 126 is cut back from the forward end of the finger 125 as at 128 to provide an arcuate surface defining substantially a one-quarter circle, the upper edge of which terminates in a substantially horizontal step 129 formed in the forward edge of the rib 126. The forward end of the transfer finger 125 is bifurcated as at 130, see Fig. 5, and provided with a transverse hole for a pivot pin 132 which is adapted to pivotally support a dog 133 in the slot 130. The dog 133 has a depending heel portion 134 which is adapted to be engaged by the end of leaf spring 135 riveted or otherwise fastened on the underside of the transfer finger whereby the dog is normally urged in a clockwise direction, see Figs. 4 and 6. The dog 133 is provided with an arcuate surface 136 which defines a substantially one-quarter circle adapted to complement the arcuate surface 128 of the transfer finger when the dog is in its normal position to provide a jaw indicated by the numeral 1330 for gripping the primer cups. The geometrical center of the jaw 1330 is adapted to lie in the horizontal plane of the spindles 64 and 80 whereby the jaw intersects the path of movement of the reciprocating spindles when the jaw is moved into its advanced position as hereinafter described.

Referring to Fig. 2, the slide 120 is held in the guide groove 117 of the bracket block 116 by means of a substantially rectangular retaining plate 137 secured by screws to the outer face of the block 116; and is adapted to be reciprocated therein by means of the rock arm 138 of a bell crank lever 139 which, as shown in Fig. 2, is pivotally supported by a pin 140 in the apertured boss 115 of the bracket 111. The end of the rock arm 138 extends upwardly through the rectangular aperture 118 of the guide groove 117 and makes an articulative connection with the rectangular aperture 122 of the slide 120 to impart reciprocating movement to the latter as the arm 138 is oscillated.

The rock arm 138 is oscillated by means of a plate cam 142 which is keyed or otherwise fastened to the main drive shaft 17 and which is engaged by the cam follower 143 of an arm 144 of the bell crank lever 139. The follower 143 is held continuously in engagement with the periphery of the cam plate 142 and by the force of a coil tension spring 145, the lower end of which is secured by suitable fastening means 146 to the base 10, its upper end being hooked over the follower pivot pin 147. In the present embodiment, the stroke of the slide 120, as determined by the plate cam 142, is substantially fifteen-sixteenths of an inch.

As shown in Figs. 4 and 5, the lower end of the hopper distributing chute 106 is supported adjacent the transfer finger 125 of the reciprocat-

ing slide 120 by means of a bracket 148, one end of which is bolted to the top of the bracket block 116. The outer reach of the bracket 148 has an upstanding flange 149 adapted to provide a fixed support for the chute 106 to which the latter is secured by screws 150.

Referring to Figs. 5 and 6, the lower end of the chute 106 comprises the two spaced parallel side plates 1060 and 1062 which are adapted to slidingly engage on opposite sides of the rib 126 of the transfer finger 125 and to extend downwardly on opposite sides thereof adjacent the shoulders 127; and the lower ends of the spacers 1063 and 1064. The ends of the spacers 1063 and 1064, see Figs. 4 and 6, are adapted to have substantially sliding engagement with the upper edge of the rib 126 and are spaced from the step 129 a distance somewhat less than the diameter of a cup.

As shown in Fig. 4, when the transfer finger 125 is in its advanced position, its jaw 1330 holds a primer between the faces of the two spindles 64 and 80 and in axial alignment therewith. In this position of the transfer finger, the delivery chute passage opens onto the step 129 of the transfer finger 125 whereby a primer cup is delivered by gravity onto the step 129 on which it is confined in a position opposite the lower end of the chute passage by the adjacent surfaces of the side plates 1060 and 1062 of the chute and the adjacent ends of the two spacers 1063 and 1064 until the transfer finger 128 is retracted to its normal position, as shown in Fig. 6.

In its normal or retracted position, the jaw 1330 is substantially opposite the end of the delivery chute passage, and hence the primer held thereat, as described above, is enabled to drop down into the cavity of the jaw, the latter being opened slightly to receive the cup due to the weight of the column of cups acting thereon. The cup is thereupon clamped in the jaw and carried forwardly to its advanced position by the reciprocating slide 120. As the jaw moves away from the open end of the passage, the next succeeding cups drop down onto the step 129. It will thus be clear that the primer cups are controlled and held in properly oriented position by confining them in a substantially closed passage from the time they are delivered into the delivery chute until they are received in the jaw of the transfer slide.

Substantially opposite the primer cup transfer jaw and on the front edge of the bed 37 is a tool holder, see Figs. 1*a* and 3, comprising a substantially rectangular block 152 having a foot 153 provided with vertical holes to receive a bolt 154 and a pair of dowels for securing the tool holder to the bed 37. A substantially rectangular groove 155 is formed in the top of the tool holding block 152 to receive the tool 156, the latter being secured in a predetermined position in its slot by means of a cover clamp 157. One edge of the clamp is adapted to fulcrum on the top of the block 152 while the other edge of the cover is made to bear down forcibly on the top of the tool by means of a bolt 158 secured in the block and extending loosely through an aperture in the cover 157; and a nut 159 which is threaded on the end of the bolt and adapted to draw the cover clamp down on the tool.

As shown in Figs. 3 and 3*a*, the cutting edge of the fixed tool 156 is located slightly to the rear or left of the button 82 of the cup supporting spindle 80, the latter being slidable rearwardly or to the left by the feed spindle 64 as hereinafter described to support the cup and to frictionally

rotate its rim or open end against the cutting edge of the fixed blade.

Beneath the tool 156 and arranged at an angle of substantially 45° is a rectangular aperture 160 which is formed on a diagonal from the forward left-hand corner of the block 152 to its rear right-hand corner, the margin of the aperture defined by the rear left-hand corner of the block being open. The aperture 160 is designed to receive a discharge chute 162 for discharging the trimmed cups and shavings from the spindles.

The chute is a substantially rectangular trough-shaped member which may or may not have a cover and is adapted to be supported at its forward end in the aperture 160 of the tool holding block. The forward end of the trough is provided with an end wall 163 and is bent at a suitable angle such that the walled end of the trough extends in a direction substantially parallel to the longitudinal axes of the spindles and lies directly beneath the cutting edge of the tool 156.

Referring to Figs. 1, 4 and 6, stripping means are provided for positively removing a trimmed cut from the rotatably mounted cup supporting spindle 80 and comprise a claw-shaped plate 164 supported so as to closely embrace substantially 180° of the periphery of the button 82 of the spindle 80. To this end, the stripper plate 164 is supported in a substantially vertical plane transverse to the longitudinal axes of the spindles by the overhanging end of a bar 165 which is secured at its rear end by bolts or screws 166 to the top edge of the upstanding members 55 of the reciprocating head stock 45, the bar 165 being bent so as to position the stripper claw properly with respect to the button 82. Furthermore, that face 167 of the claw which engages the rim of the cup to strip it from the spindle is adapted to be moved longitudinally substantially into line with or slightly to the left of the cutting edge of the fixed blade 156 as the spindle 64 advances the cup into engagement with the cutter blade whereby on the subsequent return movement of the head stock and spindle 64, the stripper claw will engage the rim of the trimmed cup and positively draw the cup off of the spindle button 82.

To prevent the stripped cup from springing up and becoming jammed between the spindles and delivery chute of the hopper or the transfer jaw, a suitably bevelled surface 168 is provided on the face 167 of the claw for deflecting the stripped cups downwardly in the trough 162.

The operation of the machine is probably clear from the foregoing description but may be briefly summarized as follows:

When the spindle motor 86 is started, the spindles 64 and 80 immediately begin to rotate at a relatively high speed. On starting, the hopper is rotated and feeds the primer cups to the delivery chute 106 while the head stock 45 and its rotating spindle 64 begin to reciprocate rapidly longitudinally of the bed 37 of the machine. Simultaneously, the slide 120 and its transfer jaw 1330 are reciprocated at substantially right angles to the longitudinal axis of the spindles.

The cycles of operation of the reciprocating feed spindle 64 and transfer jaw are indicated in Fig. 9. At position "0" and reading against the arrow, the spindle 64 is in its retracted position for substantially 47° of the cycle of the drum cam. During this time, the transfer jaw is moving from its retracted position to its advanced position. As the jaw nears the end of its stroke

in the direction of the spindles, the spindle **64** begins to advance following a short dwell of substantially 16° in its retracted position and continues to advance while the transfer jaw remains in its advanced position during a dwell of 25° cycle of the plate cam. Since the jaw **1330** is mounted so as to intersect the path of movement of the spindle **64**, the latter will pass through the jaw thereby engaging a cup therein and moving it out of the jaw onto the button **82** of the spindle **80**. Immediately thereafter, the transfer finger begins its return movement to normal position. The dog **133** of the jaw **1330** being pivotally supported by the leaf spring in the slot **130** in the forward end of the transfer finger **125** is enabled to swing outwardly and downwardly when it engages the spindle **64** so as to clear the spindle as the transfer finger is retracted. The transfer jaw reaches its rearmost position substantially 80° of the cam cycle and thereafter it dwells in this position for the remainder of the cycle. This relatively long dwell is necessary to insure a cup being fed by gravity from the delivery chute **166** into the resilient jaw as described above.

In the meantime, the spindle **64** has pushed a cup firmly against the button **82** of the rotating spindle **80**, whereupon the cap is frictionally engaged between the two spindles and rotated thereby at substantially the same speed. Moreover, the feed spindle **64** continues to advance and to move the cup and its supporting spindle **80** against the restraining force of the coil spring mounting of the latter a predetermined distance with respect to the fixed blade **156**. This predetermined distance is determined by the stroke of the reciprocating carriage and the adjustment of the head stock with respect thereto. The rim or open end of the cup is thus brought against the fixed blade **156** which turns down or cuts the rim with a substantially spiral cut until the overall length of the cup is exactly equal to the distance between the cutting edge of the fixed blade and the face **67** of the feed spindle **64** when the latter is in its foremost position.

It will be evident that, in accordance with this method and means of supporting the cup and moving it into engagement with the fixed cutter blade, the overall length of the trimmed cup is independent of the thickness of the metal forming the head of the cup. After the cutting or trimming operation has been completed, the cup is held against the fixed blade for a short period of substantially 45° of the cycle of the drum cam during which time any irregularities of the spiral cut are eliminated and the edge or rim of the cup are rendered absolutely square and true. Thereafter, the spindle **64** is returned to its normal or retracted position simultaneously moving the face **167** of the stripper claw **164** against the trimmed edge of the cup thereby positively stripping the cup off of the spindle button **82**. The stripped cup thereupon falls or is deflected by the bevelled surface **168** into the discharge chute or trough **162**.

What is claimed is:

1. A machine for trimming cup-shaped articles comprising rotatable article supporting means; rotatable means mounted to reciprocate in a path in axial alignment with said supporting means to feed an article thereon and to frictionally engage the article therewith; means for positively rotating said article supporting means and the article feeding means at substantially the same speed; a blade; drive means adapted to move the supporting means and feeding means longitudinally simultaneously in the same direction and toward said blade to carry the article into engagement therewith; and means carried by said feeding means constructed and arranged to strip a trimmed article off of said supporting means.

2. A machine for trimming cup-shaped articles comprising rotatable article supporting means; rotatable means mounted to reciprocate in a path in axial alignment with said supporting means to feed an article thereon and to frictionally engage the article therewith; means for positively rotating said article supporting means and the article feeding means at substantially the same speed; a blade; drive means adapted to move the supporting means and feeding means longitudinally simultaneously in the same direction and toward said blade to carry the article into engagement therewith; means carried by said feeding means constructed and arranged to strip a trimmed article off of said supporting means; and guide means mounted on said stripper means to deflect the trimmed articles away from said article supporting and feeding means.

3. A machine for trimming primer cups comprising a base; a rotatable spindle resiliently mounted on said base; a second rotatable spindle in axial alignment with said first spindle and constructed and arranged to be moved toward and away from said first spindle; means for transferring a cup into the path of movement of said second spindle; a fixed blade; means for rotating said first and second spindles at substantially uniform speed; means for advancing said second spindle against said cup to move said cup onto said first spindle and to frictionally engage said cup between said first and second spindles whereby said cup is rotated therewith, said spindle advancing means being adapted to move said spindles and cup a predetermined distance relative to said blade against the resilient mounting of said first spindle whereby the rim of said cup is brought into engagement with said blade; and means carried by said spindle advancing means to strip the trimmed cups from said first spindle when said second spindle is retracted.

4. A machine for trimming primer cups comprising a base; a rotatable spindle resiliently mounted on said base; a second rotatable spindle in axial alignment with said first spindle and constructed and arranged to be moved toward and away from said first spindle; means for transferring a cup into the path of movement of said second spindle; a fixed blade; means for rotating said first and second spindles at substantially uniform speed; means for advancing said second spindle against said cup to move said cup onto said first spindle and to frictionally engage said cup between said first and second spindles whereby said cup is rotated therewith, said spindle advancing means being adapted to move said spindles and cup a predetermined distance relative to said blade against the resilient mounting of said first spindle whereby the rim of said cup is brought into engagement with said blade; means carried by said spindle advancing means to strip the trimmed cups from said first spindle when said second spindle is retracted; and a bevelled surface mounted on said stripper means to deflect the stripped cup out of the path of said spindles.

5. A machine for trimming cup-shaped articles comprising a pair of rotatable shafts; a spindle fixedly secured in one shaft; a spindle resiliently

mounted in the second shaft; movable means to support the first shaft in axial alignment with the second shaft; means to positively rotate said first and second shafts at substantially the same speed; means to transfer a cup into axial alignment with the adjacent ends of said spindles; a stationary blade; and means to displace the movable supporting means of said first shaft to advance its spindle longitudinally towards the spindle of the second shaft thereby to move a cup onto the end of said second spindle and frictionally engage the closed end of the cup between the adjacent ends of the spindles to rotate said cup therewith, said shaft advancing means being arranged to move said spindles and the cup engaged therebetween a predetermined distance against the force of the resilient mounting means of said second spindle to move the edge of the cup against said stationary blade so as to trim the wall of the cup to a predetermined height.

6. A machine for trimming cup-shaped articles comprising a pair of rotatable shafts; a spindle fixedly secured in one shaft; a spindle resiliently mounted in the second shaft; movable means to support the first shaft in axial alignment with

the second shaft; means to positively rotate said first and second shafts at substantially the same speed; means to transfer a cup into axial alignment with the adjacent ends of said spindles; a stationary blade; means to displace the movable supporting means of said first shaft to advance its spindle longitudinally towards the spindle of the second shaft thereby to move a cup onto the end of said second spindle and frictionally engage the closed end of the cup between the adjacent ends of the spindles to rotate said cup therewith, said shaft advancing means being arranged to move said spindles and the cup engaged therebetween a predetermined distance against the force of the resilient mounting means of said second spindle to move the edge of the cup against said stationary blade so as to trim the wall of the cup to a predetermined height; means mounted by the first shaft to strip the trimmed cup from said resiliently mounted spindle and a chute fixedly supported beneath said stationary blade to discharge the trimmed cups stripped from said resiliently mounted spindle.

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