

April 9, 1946.

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2,398,293

TRANSFER AND ASSEMBLY MECHANISM

Filed June 24, 1943

4 Sheets-Sheet 1

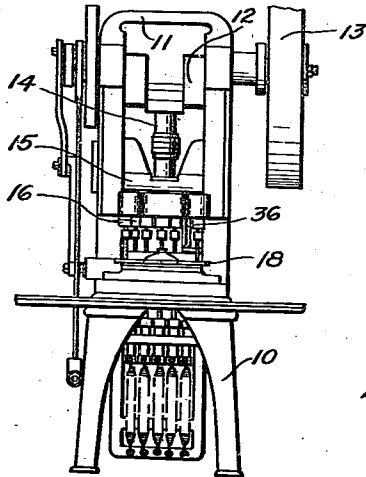


Fig. 1

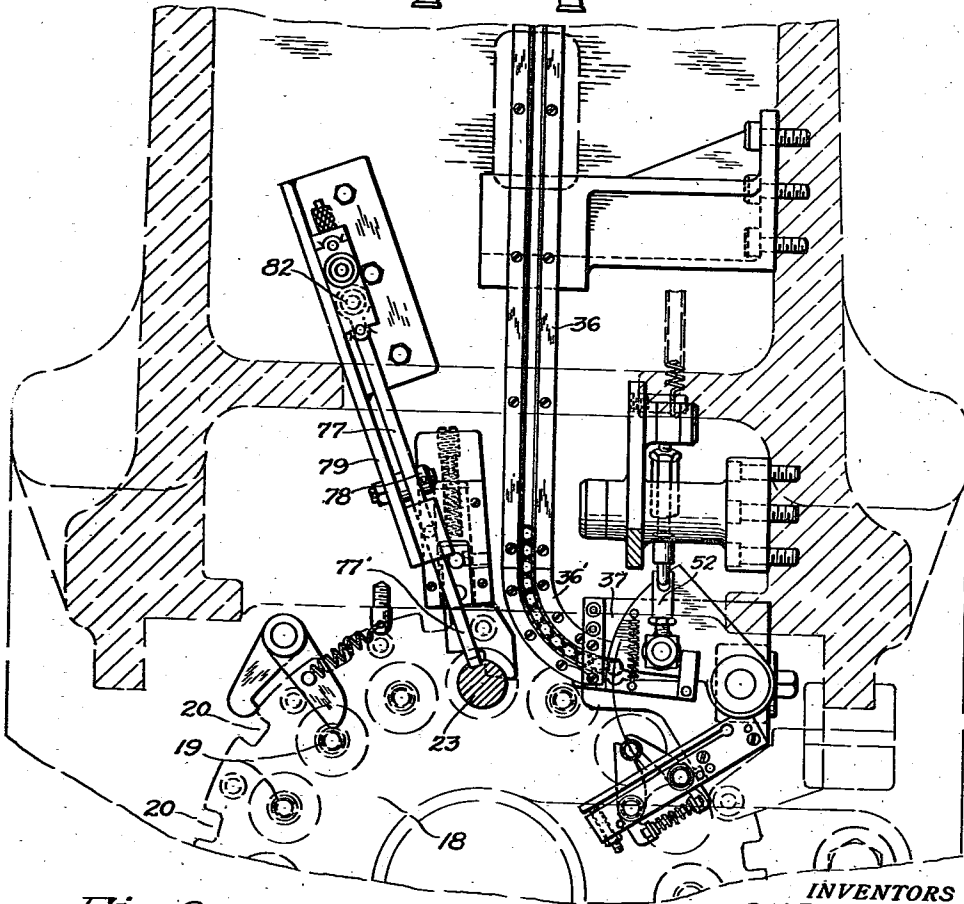


Fig. 2

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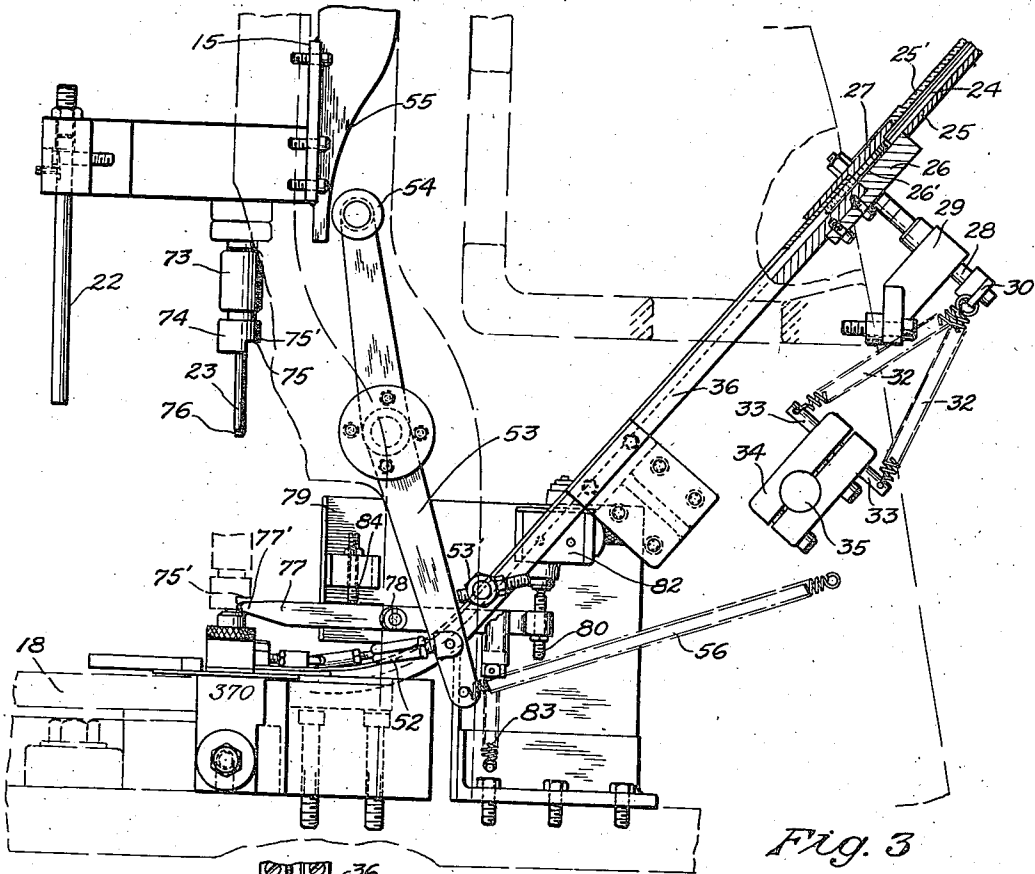


Fig. 3

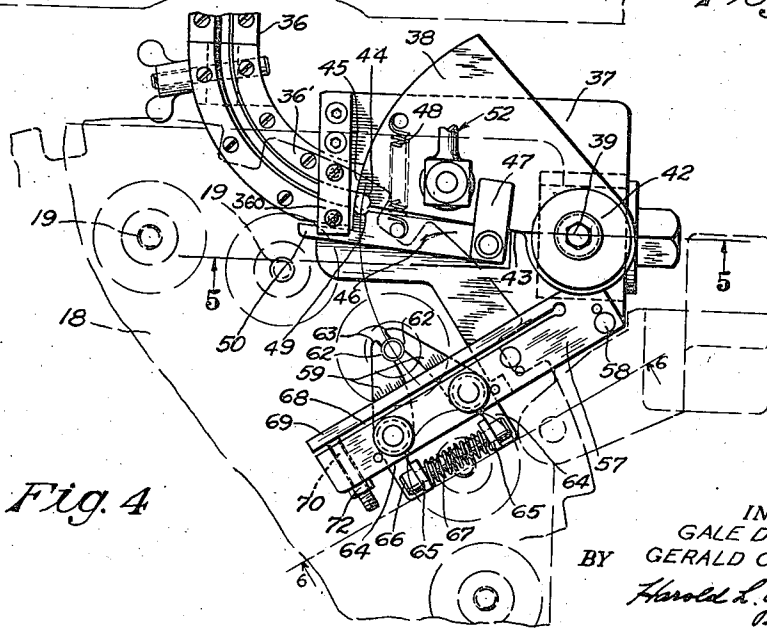


Fig. 4

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4 Sheets-Sheet 3

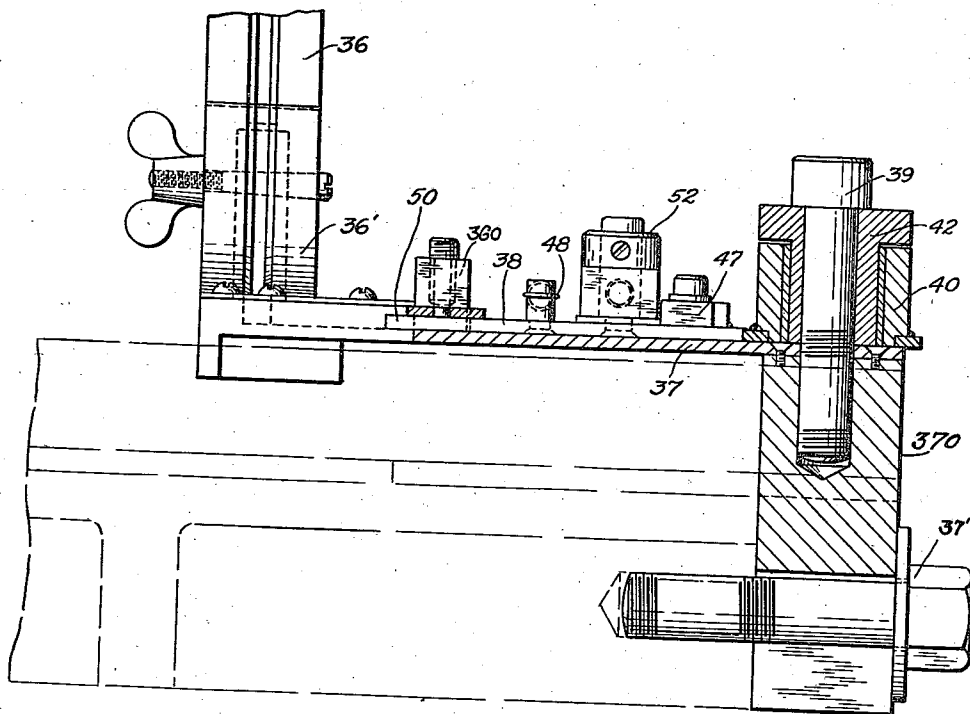


Fig. 5

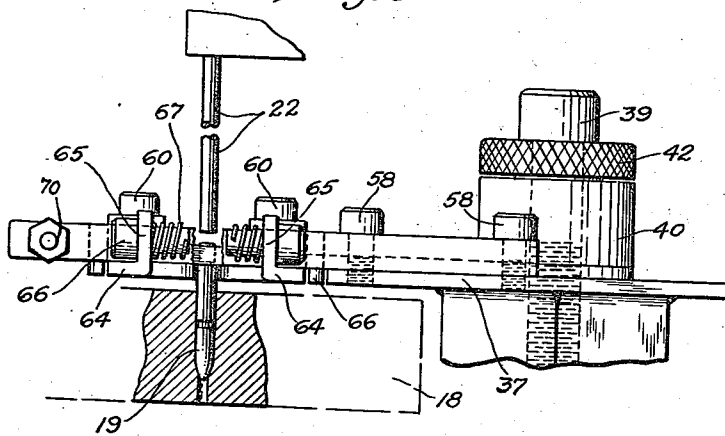


Fig. 6

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4 Sheets-Sheet 4

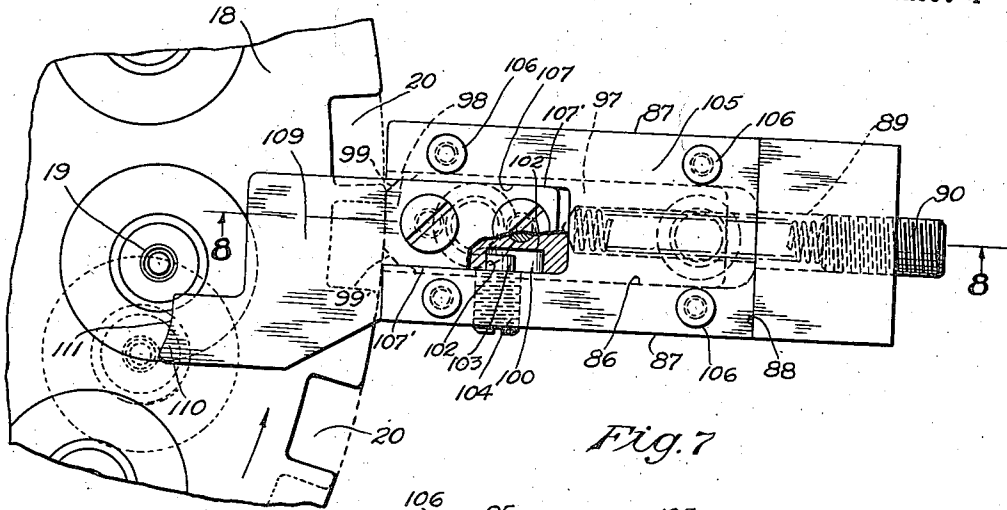


Fig. 7

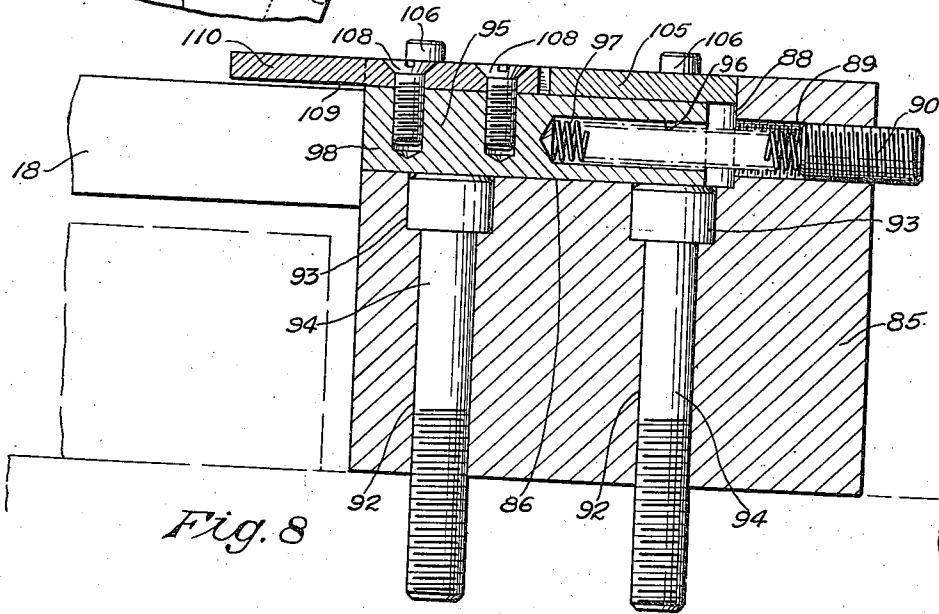


Fig. 8

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2,398,293

TRANSFER AND ASSEMBLY MECHANISM

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Application June 24, 1943, Serial No. 492,020

8 Claims. (Cl. 86—36)

This invention relates, in general, to a machine for assembling ammunition components, and, in particular, to an improved machine for inserting caps in the heel ends of jacketed bullets. Moreover, the machine may be used for priming or capping heads of cartridge shells.

An object of the invention is to provide improved means for assembling component parts of an article. A further object is to provide means for aligning a metallic tubular article with a component part prior to inserting the component part in the article. A further object is to control the operation of a bullet heel capping machine by providing suitable inspection means constructed and arranged to actuate stop means on the occurrence of an interruption in the feeding or assembly of the jackets and caps.

Other objects, features and advantages of the invention will be more particularly described in the following specification.

In the drawings:

Fig. 1 is a front elevation of a machine adapted to embody the heel capping and inspection means of this invention.

Fig. 2 is an enlarged fragmentary plan view of the machine dial showing the cap feeding and transfer means and bullet inspection device.

Fig. 3 is a side elevation of the cap feeding and transfer means shown in Fig. 2.

Fig. 4 is an enlarged plan view of the improved cap carrying sector and jacket aligning means of this invention.

Fig. 5 is a section of the cap supporting table on line 5—5 of Fig. 4.

Fig. 6 is an elevation partly in section of the bullet dial and jacket aligning means in the direction of arrows 6—6 of Fig. 4.

Fig. 7 is a plan view partly in section of the jacket inspection means and latch for automatically stopping the rotation of the dial.

Fig. 8 is a sectional elevation on line 8—8 of Fig. 7.

Referring to the drawings, Fig. 1 shows a machine which is typical of the kind of machine widely used in bullet pointing and assembling operations. Briefly, the machine comprises a base 10 having a U-shaped vertical frame 11 provided with a crank shaft 12 rotatably mounted at its upper end. The crank shaft is driven from a suitable power source (not shown) by a belt and pulley, indicated generally at 13, and is provided with a connecting rod 14 which carries a gate 15 adapted to be reciprocated vertically in suitable ways of the frame. The gate is provided with a plurality of tool holding chucks, indicated gen-

erally at 16, which are arcuately disposed on the gate immediately above the work supporting and transferring means. In the embodiment shown, the latter comprises a dial 18 rotatably supported on the base 10 and provided with circumferentially spaced work receiving apertures 19 and peripheral notches 20, as shown in Figs. 2, 4 and 7.

The present invention pertains particularly to means associated with the rotating dial and reciprocating gate for assembling caps in the heel ends of jacketed bullets.

Referring to Figs. 2 and 4, the jacketed bullets are fed into the apertures 19 of the rotating dial 18 in any suitable manner, as, for instance, by hand and are intermittently rotated counterclockwise by the dial 18, see Fig. 2, to the several successive operating stations.

In the machine illustrated in the drawings, two of these operating stations are designated by a cap inserting punch 22 and a cap inspection punch 23 both carried on the reciprocating head 15.

The bullet jacket components or caps are supplied to the machine from a suitable hopper or magazine 24 which comprises a pair of spaced parallel plates 25 and 25', the latter being the top plate and consisting preferably of glass or other suitable transparent plastic material. The magazine is manually loaded with caps and is adapted to be detachably mounted on a transverse frame member 26 of the machine at an acute angle to the vertical by suitable fastening means (not shown).

The mouth of the magazine is disposed in alignment with a slot 26' in the frame member 26. A wheel 27 is mounted in the slot having a knurled or notched periphery which is disposed substantially tangential to one edge of the slot 26'. Suitable means are provided for imparting an oscillatory motion to the wheel and comprise a shaft 28 rotatably supported by a fixed bracket 29 and secured at one end to the wheel 27. The shaft is provided at its opposite end with a pair of radially disposed lever arms 30 which are connected by a pair of springs 32 to suitable pins 33 of a block 34 secured to a shaft 35 which is oscillated by suitable means (not shown). Thus, as the shaft 35 is oscillated, the wheel 27 oscillates in its slot 26' whereby its notched periphery engages and continuously agitates the caps being fed by gravity from the mouth of the magazine 24 into the slot 26' of the frame member 26. The caps are thus fed without jamming or clogging from the lower end of the slot 26' into a chute 36, the upper end of which is fastened to the

transverse frame member 26 in alignment with its slot 26'.

The lower end or mouth of the chute 36 comprises a detachable curvilinear portion 36' adapted to guide the caps from the chute onto the surface of a table 37. The latter has a vertically depending leg portion 370 suitably secured to the table beneath the outer edge thereof and is bolted or otherwise fixedly secured as at 37' to the base of the machine so as to support the table 37 in a horizontal plane slightly above the horizontal plane of the dial 18. A bracket, indicated generally at 360, is adapted to span the end 36' of the chute and to hold it securely on the table 37.

Suitable means are provided for transferring the caps from their delivery point on the table at the end of the chute to the first station of the dial which, as stated above, is indicated by the reciprocating cap engaging and inserting punch 22. At this station, the cap is adapted to be disposed directly above a jacketed bullet supported in an aperture of the dial.

The cap transferring or carrying means comprises a sector 38, see Fig. 4, pivotally secured on the table 37 by a bolt 39, as shown in Fig. 5. The apex of the sector is provided with a bearing 40 welded or otherwise secured thereto adapted to accommodate an eccentric flanged bushing 42 for the purpose hereinafter described.

In its normal position with respect to the table, see Fig. 4, the radial edge 43 of the sector is substantially in axial alignment with the mouth of the chute at its point of contact with the table and is provided at its outer end with a semicircular notch or pocket 44 adapted to lie opposite the mouth of the chute so as to receive a cap being discharged therefrom. The end of the chute 36' is made arcuate, as shown at 45, so as to make a smooth sliding fit with the peripheral edge of the sector 38 and thereby permit a cap to be fed from the chute only when the pocket 44 of the oscillating sector is opposite the mouth of the chute.

Suitable means for holding a cap in the semicircular pocket 44 of the sector comprises a lever member 46 which is pivotally supported to the sector in the horizontal plane thereof by means of a suitable bracket 47. Formed in the edge of the lever member 46 opposite the notch 44 of the sector is a semicircular notch 49 which is adapted to be urged into cooperative relationship with the notch 44 by a coil spring 48, the latter being secured at one end to the lever 46 and at its opposite end to the sector 38.

Suitable means are provided on the lever 46 for displacing the latter laterally with respect to the sector whenever the sector has been moved into its normal position, as indicated in Fig. 4, and comprises a finger 50 which extends forwardly from the end of the member 46. This finger is adapted to engage or abut the fixed end of the chute 36' shortly before the notch 44 of the sector is brought into alignment with the mouth of the chute. The sector and member 46 are thus spread apart against the resisting force of the coil spring 48, and, accordingly, a cap is enabled to slide freely from the mouth of the chute into the notch 44 of the sector. Thereafter when the sector is moved counterclockwise, the finger 50 of the lever 46 will be disengaged from the end of the chute and the lever will thereupon be drawn into engagement with the adjacent edge 43 of the sector by the coil spring 48 so that its notch 49 moves into cooperative rela-

tionship with the notch 44, thus securely clamping the cap in the moving sector. The cap is carried or transferred thusly to the first operating station.

The eccentric bushing 42, referred to above, comprises suitable means for adjusting the sector so that its cap supporting notch may be properly positioned with respect to the cap inserting punch 22 at the first operating station. Thus, by loosening the bolt 39 and turning the knurled flange of the bushing 42, an adjustment of the sector may be effected wherein the center of rotation of the sector may be changed slightly for accurately aligning the notches 44 and 49, or a cap held therein, with the reciprocating punch.

The sector is oscillated clockwise and counterclockwise by suitable means comprising linkage, indicated generally at 52, embodying a universal joint pivotally connected at one end to the sector and at its opposite end to the lower end of the vertically disposed lever 53 which in turn is pivoted intermediate its ends to the frame of the machine. The upper end of the lever 53 has a cam roller 54, see Fig. 3, adapted to be held in engagement with a suitable cam surface 55 of the reciprocating gate by means of a coil spring 56 which is fastened at one end to the lower end of the lever 53 and at its opposite end to a fixed part of the machine. An adjustable stop screw 53' is provided adjacent the lower end of the lever for limiting the counterclockwise pivotal movement thereof. Thus, as the gate reciprocates vertically, the sector will be oscillated in a horizontal plane first to move into a position to receive a cap from the mouth of the feed chute and then to carry the cap to the first operating station.

Means are provided at the first station for aligning a bullet jacket supported in an aperture of the dial with a cap which has been carried to the first operating station by the transfer sector 38. The jacket aligning means is shown in Figs. 4 and 6 and comprises a substantially rectangular arm 57 fastened by bolts 58 or other suitable means to the table 37 so as to extend in a radial direction with respect to the bullet dial 18. Mounted on the underside of the arm 57 in a horizontal plane beneath the horizontal plane of the sector 38 is a pincher comprising a pair of suitably shaped fingers 59 pivotally supported intermediate their ends by a pair of pins 60 spaced longitudinally of and fixedly mounted on the arm 57. A semicircular recess 62 is formed in the inner edge of each finger to form a jaw portion 63 adapted to partially embrace the periphery of a bullet jacket. The opposite end 64 of each finger is provided with a vertically disposed flange 65 which is drilled horizontally to accommodate a suitable spring pilot member 66 threaded or otherwise secured therein. A coil compression spring 67 is shown telescoped over the opposed ends of the spring pilot members and is adapted thus to urge the ends 64 of the fingers apart and thereby constantly force the jaws of the fingers together whereby the latter are enabled to firmly embrace a bullet jacket. The jaws of the fingers are disposed at substantially right angles to the arm 57 and in the circular path of the bullet jackets being moved to successive stations by the intermittently rotating dial; moreover, the jaws are adapted to be accurately located immediately beneath the cap inserting punch 22. Thus, as a bullet jacket is moved to the first station, it first engages and

spreads open the jaws of the pinchers and is thereupon firmly embraced by these jaws and held thus in accurate alignment with the punch 22.

One edge of the arm 57 is slotted, as at 68, to form a resilient leaf spring 69 integral with the arm at its inner end. The outer end of the leaf spring 69 is adapted to be engaged by one end of a stud 70 which is threadedly secured in a horizontally drilled hole in the arm 57 and is adapted to be locked in adjusted position therein by a nut 72. The leaf spring constitutes adjustable means adapted to be cooperatively engaged by the edge of the lever 46, when the sector 38 has been swung into its first station position, for limiting the throw of the sector and thus enable accurate alignment of a cap with the reciprocating cap engaging punch 22 and the bullet jacket aligning pinchers.

From the first operating station, the jacketed bullet is carried by the dial out of the pinchers to the second operating station which is indicated by the cap inspection punch 23 in Figs. 1 and 3. The inspection punch is spring mounted in a chuck 16 of the reciprocating gate 15 and is provided at its upper end with an adjustable collar 14 having a substantially rectangular notch 75 in one edge which forms a shoulder 75'. The lower end or tip of the punch is of reduced diameter, as indicated at 76, for entering freely into the heel end of the bullet jacket.

Suitable means adapted to cooperate with the inspection punch 23 for automatically stopping the machine in the event a cap is missing from the heel end of the bullet jacket comprises a lever 77 pivotally supported at 78 to a bracket 79 fixed to the machine frame and provided at its rear end with a vertically mounted adjustable screw 80 which is adapted to engage a stop means which, in this instance, comprises a micro-switch 82 fastened to the fixed bracket 79. A suitable coil spring 83 is secured at its lower end to the bracket 79 and at its upper end to the rear end of the lever 77 and provides means for constantly urging the lever 77 to pivot in a clockwise direction. Adjustable means to resist pivotal displacement of the lever 77 is indicated generally at 84 and comprises a screw supported on the bracket 79 and adapted to engage the forward end of the lever 77.

As shown in Fig. 3, the forward end of the lever 77 tapers to a round nosed point 77' which is arranged to extend forwardly adjacent the path of the reciprocating inspection punch 23 and to extend into the path of the notched collar 74. Thus, when the punch 23 moves downwardly, the shoulder 75' of the collar 74 overlies the end 77' of the lever 77, as shown by the dotted lines in Fig. 3.

When the cap is present in the jacket heel, the downward movement of the punch will be stopped before the shoulder 75' of the punch strikes the end 77' of the lever. However, in the event no cap is present in the bullet jacket, the punch is free to move downwardly an additional amount substantially equal to the thickness of a cap. As a result, the shoulder 75' of the collar 74 strikes the end of the lever 77 and tilts it counterclockwise thereby overcoming the restraining force of the coil spring 83 and actuating the switch 82 which stops the machine. As soon as the inspection punch 23 is returned to its uppermost position, the lever 77 will be freed from contact by the shoulder 75' and is thereupon returned to its normal set position by the spring 83.

The above described cap inspection operation

is performed at the second operating station. At this same station, suitable means are provided for inspecting for the presence of a bullet jacket in an aperture of the dial.

Referring to Figs. 2, 7 and 8, the bullet jacket inspection device comprises a substantially rectangular solid block or base member 85 having a substantially rectangular groove 86 milled or otherwise formed in its upper forward edge. The sides or walls 87 of the groove 86 are substantially parallel and are closed at the rear end of the groove by a transverse substantially vertical wall or shoulder 88, which is provided with a horizontally drilled aperture 89 threaded to accommodate a stud screw 90. A pair of bolt holes 92 are drilled vertically through the base 85 and counterbored, as at 93, to seat the heads of a pair of bolts 94 adapted to fixedly secure the block 85 to the base of the machine.

As shown in Fig. 7, the longitudinal axis of the groove 86 is disposed substantially radial to the axis of the dial 18.

Mounted to slide in the groove 86 is a substantially rectangular latch member 95 which is somewhat shorter than the groove 86 and substantially equal in width to the width of a notch 20 in the periphery of the dial 18. The latch is provided with a hole 96 drilled horizontally in its rear end, the hole being in axial alignment with the hole 89 of the shoulder 88 and adapted to accommodate the forward end of a coil compression spring 97, the rear end of which abuts the adjacent end of the stud 90. The forward end or nose 98 of the latch 95 is formed with bevelled corners 99 to facilitate entry of the latch into the notches 20 of the dial. In its normal position, the front edge of the latch is urged by the force of the compressed spring 97 against the notched periphery of the dial 18.

Suitable means for limiting the length of stroke of the latch 95 in its groove 86 comprises a substantially rectangular recess 100 formed in one side of the latch having end walls 102 and adapted to accommodate the end 103 of a stud screw 104 which is threadedly secured in a hole drilled horizontally in one wall 87 of the block 85. Forward and rearward movement of the latch in the groove is thus limited by engagement of the end 103 of the stud with the shoulders 102 of the recess.

The latch member is held down in the groove by means of a cover plate 105 which is fastened to the upper edges of the walls 87 by suitable bolts 106. The forward edge of the cover plate is slotted longitudinally, as shown at 107, the width of the slot being slightly less than the width of the latch so as to form lips 107' overlying the edges of the latch.

Secured on top of the latch 95 by suitable screws 108 is an inspection member 109, the rear end of which is constructed and arranged to make a smooth sliding fit in the slot 107 of the cover plate 105. The forward end of the member 109 overlies the periphery of the dial 18 in a horizontal plane substantially parallel thereto and is provided with a suitably shaped finger portion 110 which extends normally into the path of a bullet jacket being traversed from the first station to the second station by the dial. Moreover, the jacket engaging finger 110 is displaced laterally with respect to the latch 95 so that the finger will be engaged by a bullet jacket preceding and during rotation of a notch 20 of the dial into a position opposite the nose 98 of the latch. To this end the finger is provided with an arcuate edge 111 substantially equal in length to the

width of the notch 20 whereby a jacket will continuously engage and retain the finger 110, and hence the latch 95 in their normal retracted positions when the latch is opposite a notch 20 of the dial, see dotted lines in Fig. 7. Prior to being engaged by a bullet jacket, the finger 110 and latch are restrained in their normal retracted positions by the nose of the latch which engages the periphery of the dial, as shown.

It will be clear, however, that whenever a jacket is absent from a dial aperture, the finger 110 will be held back in its normal retracted position only so long as the nose 98 of the latch engages the periphery of the dial and that whenever a notch 20 of the dial moves opposite the latch the spring pressed latch will be free to move forward into the notch 20. As a result, further rotation of the dial is immediately stopped. The machine may be restarted by manually pushing the finger rearwardly so as to withdraw the latch from the notch of the dial and then partially rotating the latter so that the nose of the latch will again engage the periphery of the dial.

In operation, as the dial 18 is intermittently rotated, jacketed bullets are fed manually into the dial apertures 19. The jackets are thereby moved counterclockwise, see Fig. 2, so as to pass between and spread open the resilient fingers 59 of the pinchers. The jacket is thus momentarily held by the pinchers at the first operating station in alignment with the cap assembling punch 22. Meanwhile, a jacket heel cap has been picked up by the oscillating sector and carried over to a position directly beneath the reciprocating assembling punch 22. Thereafter, as the punch moves downwardly, it engages the cap and pushes it out of the sector into the open end of the axially aligned jacket. The punch and sector then return to their normal positions while subsequent rotary movement of the dial carries the capped jacket out of the pinchers to the second operating station. On approaching the second station, the finger 109 will be engaged by the jacket and held in its normal retracted position until the jacket is positioned immediately below the cap inspection punch 23, the spring urged latch 95 being thereby held out of locking engagement with a notch 20 of the dial. At the second inspection station, the punch 23 descends to inspect for a cap. If a cap is properly located in the jacket, the machine will continue to traverse the jacket to subsequent stations (not shown) where the heel of the jacketed bullet is crimped and the bullet finally ejected from the machine. However, if a jacket is not in a dial aperture at the second operating station or if a cap has not been inserted into the jacket, then the latch 98 or the respective lever 77 will be actuated in the manner described above to stop the machine and enable correction of the malfunction.

What is claimed is:

1. In a machine for assembling component parts of an article comprising an article supporting dial adapted to move a plurality of articles to a series of operating stations; means at one station for feeding components to said articles; and means at a subsequent station for stopping said dial in the absence of an article in said dial comprising a member spring biased to move into engagement with said dial to stop the movement thereof, and an article inspection member carried by said stop member and adapted to extend into the path of articles in said dial and to be displaced from said path by engagement

with an article in said dial, said spring biased stop member being held out of engagement with said dial when said inspection member is engaged by an article in said dial.

2. In a bullet assembling machine comprising a dial having bullet jacket supporting apertures and peripheral notches adapted to move a plurality of jackets to a series of operating stations; means at one station for feeding caps into the heels of said jackets; and a reciprocable stop member supported adjacent the periphery of said dial and resiliently urged normally to engage in the notches thereof for locking said dial and jacket inspection means carried on said stop member intermediate said feeding and stopping stations adapted to extend into the path of a jacket in an aperture of said dial and to be displaced from said path by engagement with a jacket, said stop member being withdrawn from engagement with said dial notches by displacement of said inspection means and released to lockingly engage in said notches when said inspection means is disengaged from a jacket in said dial.

3. In a bullet assembling machine, the combination with a dial having jacket receiving apertures, a table, and a chute for feeding caps onto said table; of an oscillating member pivotally supported on said table to move in a plane parallel to the plane of said table constructed and arranged to receive a cap supported on said table at the end of said chute and to carry said cap into position to be assembled in a jacket supported in a dial aperture; pivotally mounted fingers spring biased into gripping position to engage and align the jacket with said cap when the latter has been carried into assembling position; a reciprocating punch for assembling said cap in the heel of said jacket; means to inspect for the presence of a cap in the heel of a jacket; and inspection means constructed and arranged to extend into the path of jackets in said dial to detect the presence of jackets in said dial apertures by engagement with said jackets, said inspection means having a latch normally adapted to lockingly engage said dial but to be held in ineffective position whenever said inspection means engages a jacket.

4. In a machine for performing a series of operations on articles; means for supporting and traversing the articles to a series of operating stations, said traversing means having shoulders; means for stopping said article traversing means in the absence of an article therein comprising a latch slidably mounted substantially in the plane of said traversing means and spring biased normally to move into engagement with one of the shoulders of said traversing means to stop the movement thereof; and an article inspection member carried by said latch constructed and arranged to extend into the path of articles in said traversing means to engage articles in said traversing means and thereby to hold said biased latch out of engagement with a shoulder of said traversing means.

5. In a bullet assembling machine comprising a dial having projectile receiving apertures; a table; a cap feeding chute arranged to deliver caps upon the table; oscillating means; means for pivotally supporting said oscillating means on said table, said oscillating means being adapted to receive a cap supported on said table at the end of said chute and to carry said cap into a position to be assembled on the heel of a projectile in said dial; a support fixed to said table; and fingers pivotally

mounted on said support above said dial and spring biased into gripping position to engage and align a projectile in said dial with the cap when said cap has been moved into assembly position.

6. In a bullet assembling machine comprising a dial having projectile receiving apertures; a table; a cap feeding chute arranged to deliver caps upon the table; oscillating means; means for pivotally supporting said oscillating means on said table, said oscillating means being adapted to swing in a plane parallel to the plane of said table and to receive a cap supported thereon at the end of said chute to carry said cap into a position to be assembled on the heel of a projectile in said dial; a support fixed to said table; fingers pivotally mounted on said support above said dial and spring biased into gripping position to engage and align a projectile therein with the cap when said cap has been moved into assembly position; and resilient means formed as an integral part of said support to stop the cap carrying means in assembly position in axial alignment with said pivotally mounted fingers.

7. In a machine for assembling an article from component parts, the combination comprising a movable device for receiving a plurality of identical components and indexing said components successively to an assembly station; means at said assembly station comprising a fixed support and component gripping devices mounted on said support adapted to engage a component in said indexing device and hold said component accurately in assembly position regardless of variations in the movement of said indexing device; and means

for delivering a second component to the first component thus held in assembly position comprising a second component supply, and an oscillating transfer device adapted to receive and transfer components successively from said supply to a position in alignment with the first component held in said assembly position.

8. In a machine for assembling an article from component parts, the combination comprising a movable device for receiving a plurality of identical components and indexing said components successively to an assembly station; means at said assembly station comprising a fixed support and component gripping devices mounted on said support adapted to engage a component in said indexing device and hold said component accurately in assembly position regardless of variations in the movement of said indexing device; means for delivering a second component to the first component thus held in assembly position comprising a second component supply, and an oscillating transfer device having a pivotal mounting on said support and adapted to receive and transfer components successively from said supply to a position in alignment with the first component held in said assembly position; and means for adjusting said oscillating transfer device comprising an eccentric bushing associated with said pivotal mounting arranged to change the center of rotation of said transfer device to accurately align a second component therein with the first component held in said assembly position.

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