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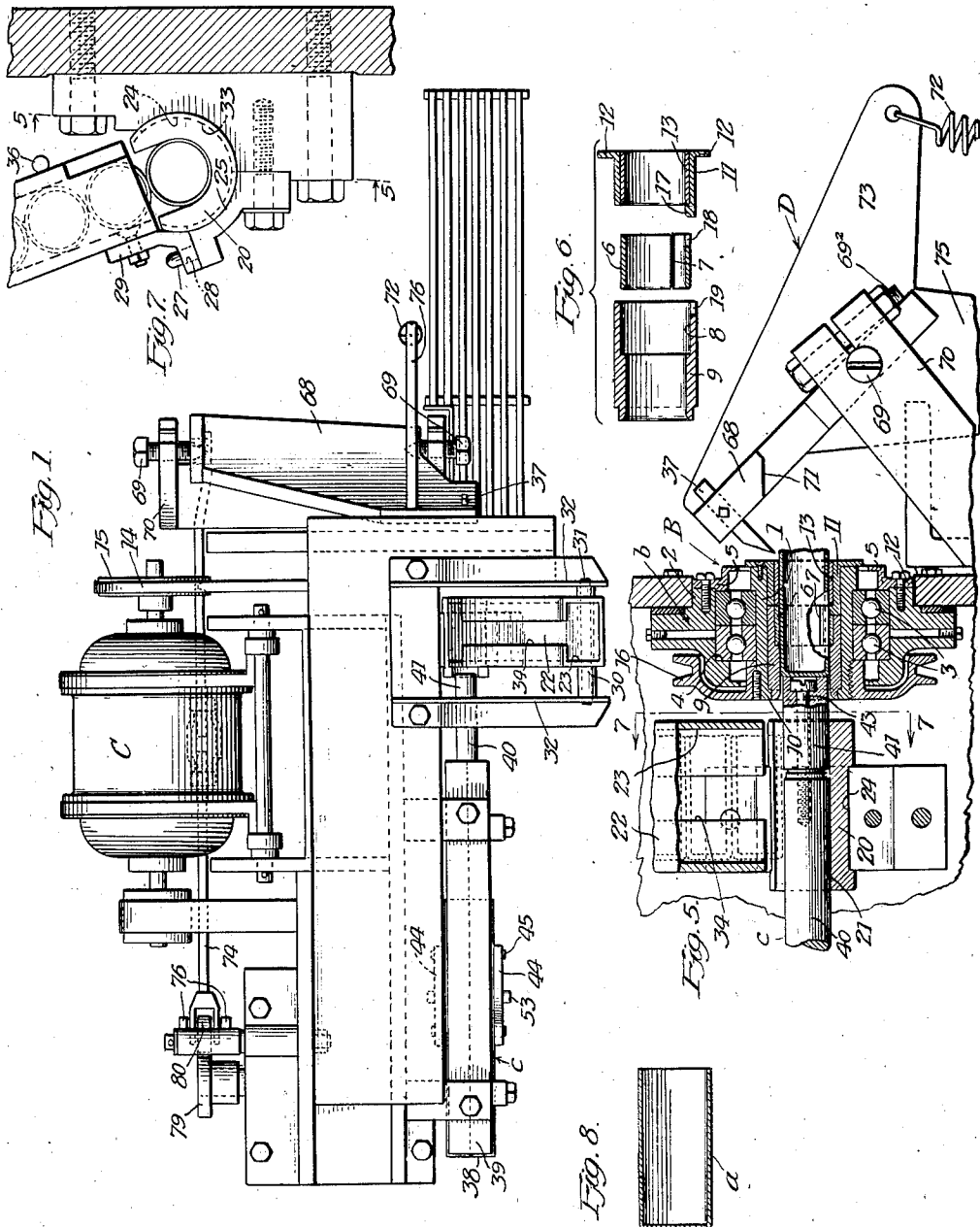
M. A. McCREARY

1,967,153

MACHINE FOR TRIMMING TUBULAR METAL ARTICLES

Filed April 26, 1933

3 Sheets-Sheet 1



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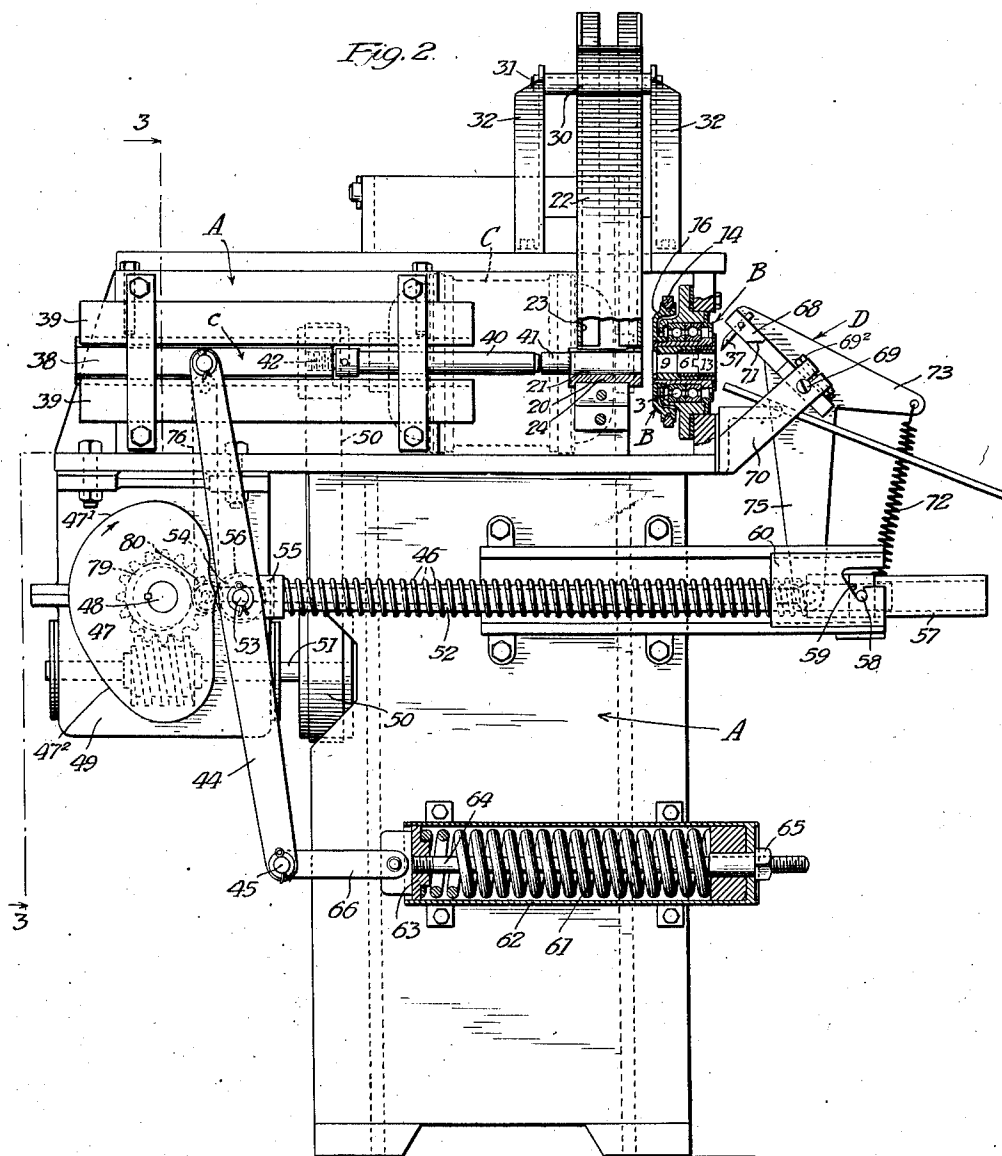
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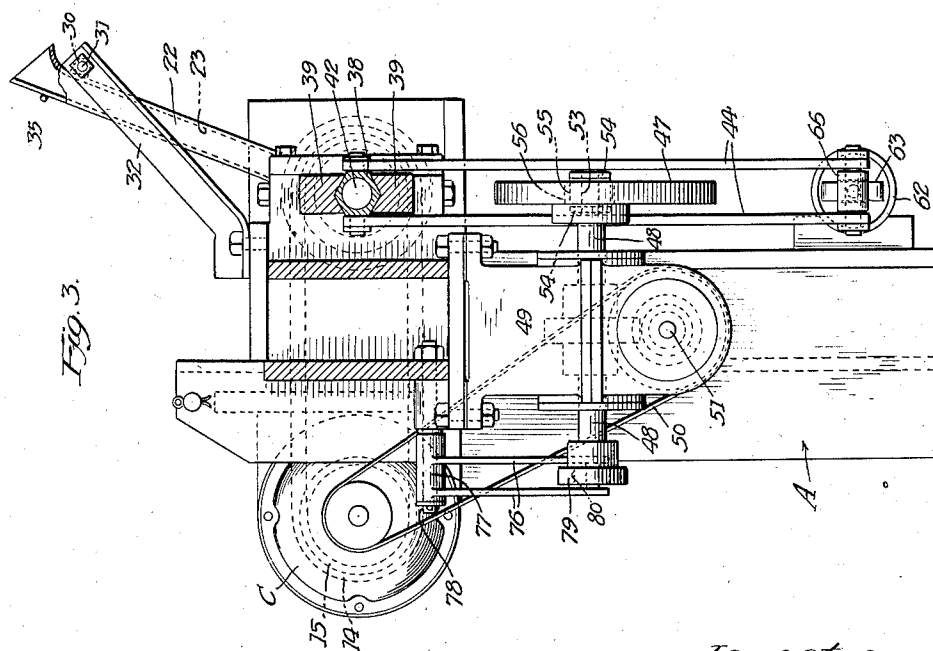
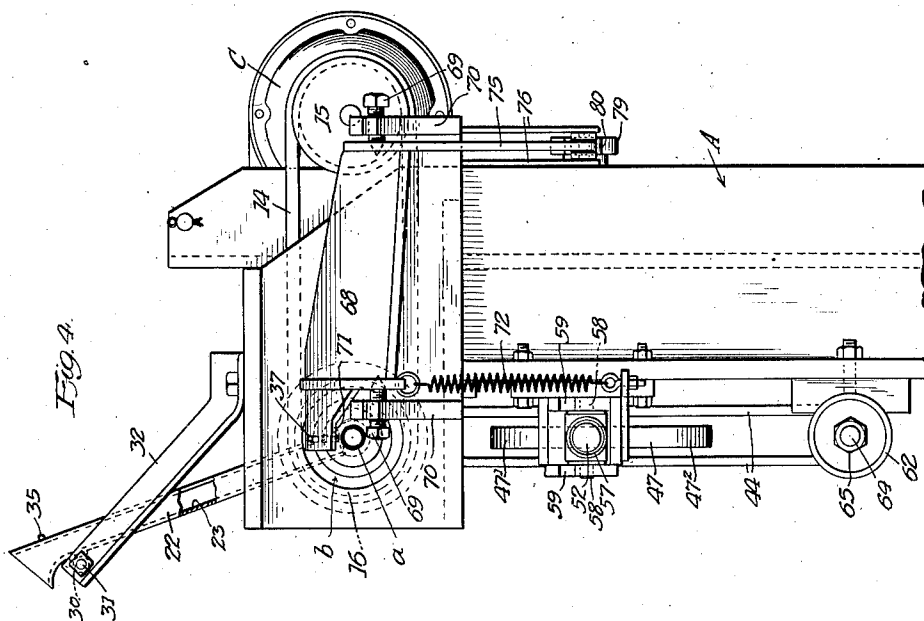
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,967,153

MACHINE FOR TRIMMING TUBULAR METAL ARTICLES

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Application April 26, 1933, Serial No. 668,015

18 Claims. (Cl. 164—36)

This invention relates to trimming machines, and relates particularly to machines for trimming the ends of tubular metal articles, as battery cans or shells and the like.

5 The object of the invention is to provide a machine adapted for trimming tubular metal articles so that their ends will be substantially square with their axes, imparting a finished appearance to said articles and, also, making them
10 of uniform length.

To effect the objects thereof, a machine embodying my invention and improvements comprises the various features, combinations of features and details of construction hereinafter described and claimed.

In the accompanying drawings, in which the invention is fully illustrated,

Fig. 1 is a top plan view of a machine embodying my invention and improvements.

20 Fig. 2 is a side elevation of the left side of the machine viewed from the right side of Fig. 1, showing certain parts in section.

Fig. 3 is a view partly in end elevation and partly in section indicated, respectively, by the line 3—3 of Fig. 2.

25 Fig. 4 is an end elevation of the machine as viewed from the right hand side of Fig. 1.

Fig. 5 is an enlarged, fragmentary view of parts shown in section in Fig. 2 and certain associated parts.

30 Fig. 6 is an enlarged, detached view of the work-holding chuck.

Fig. 7 is a sectional elevation on the line 7—7 of Fig. 5; and

35 Fig. 8 is a central, longitudinal, sectional view of a finished shell or article for trimming which my improved machine is particularly adapted.

In the drawings, in which, for purposes of clear and definite illustration, I have shown my invention and improvements embodied in a machine particularly described and adapted for trimming and finishing the article shown in Fig. 8 of the drawings, designated *a*, which it is assumed is a battery can or shell made of suitable metal, as sheet zinc, which may be produced economically in commercial quantities from flat blanks by means of a stamping or punch press. What I now consider a preferable machine for this purpose is shown and described in United States Letters Patent No. 1,935,854, dated November 21, 1933, to which reference is here made for a description thereof in detail. As the tubular articles *a* are discharged from the punch press, their "following" ends are irregular and uneven, and the machine of the present appli-
55

cation is designed and adapted for trimming the ends of said articles to make them of substantially uniform length and with the planes of the finished ends thereof square with their axes.

Describing my improved machine with reference to the drawings, A designates the frame of the machine as a whole, which, as shown, is built up from sheet metal plates welded or otherwise rigidly connected, but which may be made of cast iron, if desired.

The operative parts of the machine are mounted on said frame and comprise a spindle and chuck mechanism designated as a whole B, see particularly Fig. 5, designed and adapted for holding the articles *a*, Fig. 8, while being trimmed. 60 As shown, the spindle 1 is hollow and is rotatably mounted in a housing designated as a whole *b*, said housing comprising a circular shoulder fitted to a bearing formed in the frame of the machine, as shown at 2, and being bolted or otherwise secured to the frame of the machine, see particularly Fig. 5. In the preferable construction shown, the spindle 1 is rotatably mounted by means of ball bearings 3, the outer ball races of which, as shown, are confined between 65 a shoulder 4 on the housing *b* and a clamping plate 5 secured to said housing, as shown.

The chuck for holding the work consists of a chuck proper 6 made in the form of a ring of resilient material, preferably tool steel hardened, 85 which is cut through lengthwise at one side, as shown at 7, thus providing for contraction and expansion thereof. As mounted for use, see particularly Figs. 5 and 6, the chuck proper 6 is confined in a recess 8 formed in a bushing 9, the normal outside diameter of said chuck proper being slightly less than the diameter of the recess 8, and said bushing 9 being confined in operative position within the spindle 1 between interlocking shoulders on said spindle and bushing, as shown at 10, and the inner end of a bushing 11 fitted to the delivery end of the bore of said spindle 1. Also, the bushing 11 has an outwardly projecting flange 12 at its outer end, which is secured to the outer end of the spindle 1, as by screws, so that said spindle and bushing will rotate together. As shown, also, the bushing 11 comprises a lining 13 preferably made of hardened tool steel which has a forced fit with the bore of said bushing.

In operation, rotation is imparted to the chuck spindle 1 by driving connection with a source of power, preferably an electric motor C mounted on the machine frame, said driving connection consisting, as shown, of a belt 14 adjusted to pul- 110

leys 15 and 16 secured, respectively, to the motor shaft and to the spindle 1.

As shown, rotation is also imparted to the chuck proper 6 and to the bushing 9 in operation, by a lug 17 on the inner end of the bushing 11 which, as assembled for use, interlocks with notches 18 and 19 formed in the ends of said chuck proper and bushing proximate the inner end of the bushing 11.

As shown, see particularly Fig. 5, the lug 17 extends radially inwards so that it overlaps the end of the lining 13 of the bushing 11, forming a stop which defines the position of the lining in said bushing.

As stated, the normal outside diameter of the chuck proper 6 is slightly less than the diameter of the recess 8 in the bushing 9, while the normal inside diameter of said chuck proper is sufficiently smaller than the outside diameter of the shell or article *a* for operating on which the machine is set, that when an article *a* is forced into said chuck endwise, it will expand said chuck and cause it to frictionally engage the article *a* with sufficient force to impart rotation to said article when it is presented to the trimming tool, as presently described.

As shown, the notches 18 and 19 in the chuck 6 and bushing 9 are at the "following" side of the slit 7 in said chuck, with which relation it is obvious that, under the pull of the sleeve 11 on the chuck proper 6, resistance to rotation of said chuck will operate to contract the chuck upon an article *a* held within the same, thereby increasing its frictional engagement with said article and rendering rotation of the article more certain.

Obviously, by providing bushings 9 and 11 having bores of different size and chucks proper 6 proportioned to function with different sizes of bushings, the machine may readily be adjusted to operate on shells or articles *a* of different size.

To reduce side draft on the relatively short chuck spindle 1, due to the pull of the driving belt 14, the web of the pulley 16 is curved, as shown in Fig. 5, to reduce the axial distance between the center of the spindle bearing and the line of pull of said belt.

In operation, the articles *a* to be trimmed are adapted to be delivered to and, after being trimmed, ejected from the chuck mechanism B by means as follows. Supported in fixed position on the frame A of the machine in axial alignment—as near as may be—with the chuck spindle 1, is an open-sided, trough-shaped holder 20, the opening 21 in which is shaped and proportioned to receive articles of the size on which the machine is operating at a given time. As shown, said articles *a* are adapted to be delivered into said holder 20 from a magazine 22 mounted in approximately upright position on the frame of the machine, said magazine being provided with an opening or passageway 23 which extends lengthwise through the same and is shaped and proportioned to receive the articles *a* sidewise with sufficient clearance to permit said articles to move downwards through said magazine freely, impelled by gravity only. The lower end of the passageway 23 is in substantial alignment with the open side of the holder 20, so that articles *a* may pass freely from the discharge end of the magazine into said holder.

To adapt the machine for trimming blanks of different sizes, the holder 20 is removably secured in position on the machine frame thus providing for detaching said holders and replacing

them with others having slots or recesses for receiving and supporting articles *a* of different size. As shown, the different holders 20 are all of the same exterior size and shape and are interchangeable in a seat 24 formed partly in the rigid frame of the machine and partly in a clamping member 25, detachably secured in position on the machine frame by screws or other suitable means, the relation being such that when said member 25 is detached, the holder 20 may be removed from its seat on the machine frame.

In like manner, the magazine 22 is removably mounted on the machine frame and different magazines for receiving and delivering articles *a* of different size to the holder 20 are provided, all of which are interchangeable. As shown, the means for mounting said magazines consists of dowel pins 27 on the machine frame adapted to engage holes 28 formed in brackets 29 secured to the lower ends of the different magazines. As shown, also, the means for interchangeably mounting said magazines on the machine frame consists of sleeves 30 welded or otherwise secured to said magazines, and rods 31 adapted to extend through said sleeves, the ends of which are adapted to be secured in holes formed in spaced standards 32 secured to the machine frame. As shown, the holders 20 are held against endwise movement in the seat 24 by shoulders formed at the ends of annular recesses formed in their outer surfaces, which interlock with rigid parts of the machine frame, as shown at 33, Fig. 5.

Also, to render the shells or articles *a* accessible so that they may be straightened in the passageway 23 of the magazine, should one or more thereof become "cocked" and lodged therein, said magazine is provided in its wall proximate the machine frame, with an opening 34 which extends from end to end thereof. As shown, also, the severed sides of said magazines are connected adjacent their opposite ends by tie rods 35 and 36 welded or otherwise rigidly secured thereto.

In operation, cans or articles *a* are adapted to be delivered from the holder 20 on the machine to the chuck 6, in operative relation to the trimming tool or cutter 37, presently described, trimmed, and then ejected from said chuck by a plunger designated as a whole *c*, comprising a slide member 38 fitted to guide bearings formed in bearing members 39 secured in fixed position on the machine frame, so as to reciprocate therein; a rod 40 detachably secured to the end of said slide member proximate the chuck mechanism B; and a tip section 41 detachably secured to the end of said rod.

As shown, said rod 40 is detachably secured to the slide member 38 by means of a shank 42 thereon, which has screw-threaded engagement with a hole formed axially in the end of said slide member, and the tip section 41 of the plunger is detachably secured to the end of said rod by a headed screw 43 which extends through a hole formed axially through said tip section and has screw-threaded engagement with a hole formed in the end of said rod 40, the outer end of said hole being counter-bored as shown, so that the head of the screw will be entirely inside of the end surface of said tip section, which is designed to contact with a can or article *a* in the holder 20, in operation.

By providing rods 40 and tip sections 41 of different sizes, which are interchangeable, the machine may readily be adapted for operating on articles *a* of different sizes. Such interchangeability, however, will also necessitate the use of

interchangeable chucks 6 and bushings 9 and 11, of sizes corresponding to different sizes of the articles *a*.

In the operation of the machine, reciprocating movement is imparted to the plunger *c* by means as follows: Pivoted at their upper ends to the slide member 38 of said plunger are levers 44 the lower ends of which are pivoted to a yielding, but under normal conditions, fixed support 45 on the machine frame. The levers 44 are maintained yieldingly in position corresponding to extreme retraction of the plunger *c*, by a spring 46 applied thereto between their ends, and are adapted to be turned pivotally against the force of said spring by a cam 47 to which rotation is imparted in operation by driving connection of the shaft 48 to which said cam is secured with the armature shaft of the motor *C*, said driving connection comprising a reducing gear indicated at 49, which may typify any usual or desired form of reducing gear of which different kinds are available commercially and the particular reducing gear indicated need not, therefore, be shown or described in detail. As shown, said reducing gear 49 is driven by a belt 50 adjusted to pulleys secured to the motor shaft and to the drive shaft 51 of said reducing gear, what I now consider a preferable rate of rotation of the cam shaft being approximately 80 R. P. M.

As shown, the spring 46 is a coil spring and, as installed for use, surrounds a rod 52 as a guide, one end of which is connected to the levers 44 by a pin 53 which engages bearings formed in said levers and in spaced lugs 54 formed on a head 55 secured to said rod 52, between which an anti-friction roller 56 is rotatably mounted in position to contact with the operating face of the cam 47.

The spring 46 acts in compression and, in use, is subjected to and maintained under desired compression by means of a tubular anchor member 57, the bore of which is slightly larger than the rod 52. Trunnions 58 on opposite sides of said anchor member are adapted to interlock with bayonet slots 59 formed in plates 60 forming sides of a box member in which said spring 46 and certain associated parts are partly enclosed, the relation being such that when said anchor member is adjusted to the end of the rod 52 and forced inwards against the force of the spring 46 to effect engagement of the trunnions 58 with the bayonet slots 59, said spring will be under contemplated operating compression. Obviously, by making the anchor member 57 of considerable length and positioning the trunnions 58 nearer one end of said anchor member than the other, the compression of the spring 46 may be varied by utilizing the longer or the shorter end of said anchor member for effecting compression of said spring.

As shown, the yielding pivot or fulcrum of the levers 44 consists of a spring 61 which is sufficiently stiffer than the spring 46 that, under contemplated normal operating conditions, no compression of said spring will occur in operation, but if, for any reason, the plunger *c* should jam, continued rotation of the cam 47 will merely operate to compress the spring 61, thus permitting the machine to run without subjecting the parts thereof to stresses which might otherwise break them.

As shown, said spring 61 is housed in a tubular casing 62 secured to the machine frame, the end of said casing proximate the levers 44 being open and its opposite end closed, said spring 61 reacting between the closed end of the casing

62 and a head 63 secured to the end of a rod 64 the opposite end of which extends through and is loosely fitted to a hole formed in the closed end of said casing and threaded to the projecting end of which is a nut 65. Said nut provides means for adjusting the tension of the spring 61 which, as stated, is calibrated to provide a fixed pivot or fulcrum for the levers 44 under normal operating conditions, but will yield under abnormal operating stresses to which the levers 44 may be subjected in use.

As shown, the head 63 on the rod 64 is connected to the levers 44 by a link 66, thus permitting the levers 44 to turn freely on the pivots connecting them to the slide member 38 of the plunger *c* without binding.

With the operative parts of the machine in the positions shown in Fig. 2—corresponding to full retraction of the plunger *c*—rotation of the cam 47 in clockwise direction will operate to advance said plunger to transfer a can or article *a* from the holder 20 to the chuck mechanism *B* with its open end projecting through and beyond said chuck mechanism, substantially in the relation shown in dotted lines in Fig. 5, in which position it will be held by the chuck 6, which, as heretofore explained, will cause said can or article to rotate with the chuck spindle 1 of the machine. This is the position which said articles *a* will occupy during the trimming operation—a dwell corresponding to rotation of said cam through a contemplated angle, which we will assume to be 120°—being imparted to the plunger *c* by engagement of a circular portion 47' of the operating face of the cam 47 with the anti-friction roller 56 mounted on the levers 44. The can or article *a* having been trimmed, the plunger *c* is advanced to eject said article from the chuck mechanism and from the machine, by engagement of the portion 47' of said cam with said anti-friction roller 56. The can or article *a* having been ejected, the anti-friction roller 56 passes into engagement with a portion of the cam proportioned to permit full retraction of the plunger *c* by the spring 46, the operative face of the cam being so shaped and proportioned that a dwell corresponding to rotation of the cam through an angle of approximately 15° will be imparted to the plunger *c* to permit an article *a* to fall from the magazine 22 into the holder 20. This completes the cycle of operations, which are repeated continuously during operation of the machine.

As shown, the trimming tool 37 is secured in a holder designated as a whole *D*, comprising a plate 68 pivoted by hardened tool steel screws 69 threaded into brackets 70 on the machine frame, and having their ends tapered to substantially 60°, said tapered screw ends engaging suitably countersunk holes in the plate 68. The screws 69 provide for taking up wear and also means for adjusting the cutting tool laterally of an article *a* supported in the chuck mechanism *B*. As shown, the holes to which the screws 69 are threaded are slit and when said screws are properly adjusted therein are clamped in position by bolts 69', see Fig. 5. As shown, the plate 68 is cut away, as shown at 71, to permit discharge of trimmed cans or articles from the chuck mechanism. The plate 68 is maintained yieldingly retracted with the tool 37 in operative relation to a can or article *a* supported in the chuck mechanism *B*, by a spring 72 which connects an arm 73 on the frame plate 68 with a rigid part of the machine frame, and said plate is adapted to be turned pivotally at each revolution of the cam

shaft 48 to cause the tool 37 to sever the end of a can or article *a* projecting from the chuck mechanism B, by a rod 74 one end of which is pivoted to an arm 75 which depends from the plate 68, and the opposite end of which is pivoted between spaced arms 76 formed on a sleeve 77 pivotally mounted on a stud 78 on the machine frame. In operation, the plate 68 is adapted to be turned pivotally against the force of the spring 72, to cause the tool 37 to function, by means of an eccentric cam 79 secured to the cam shaft 48 at the opposite side of the machine from the cam 47, which co-operates with an anti-friction roller 80 mounted on the rod 74 to move said rod endwise in a direction to feed the trimming tool 37 into the article *a*. Said cam 79 is timed so that said tool will be forced into its cut during engagement of the section 47' of the cam 47 with the anti-friction roller 56 mounted on the levers 44. Also, to provide for varying the operative length of the rod 74, said rod consists of separate sections connected by a turn buckle as shown, see Fig. 1.

I claim:

1. In a machine for the purpose specified, the combination of a frame, a chuck mechanism supported therein comprising a fixed housing, a hollow chuck spindle rotatably mounted in said housing, means for rotating said spindle, a hollow resilient chuck proper mounted within and operatively connected with said chuck spindle so as to rotate therewith, and means for separately delivering articles to be trimmed to said chuck, means for trimming articles held in said chuck, and means for ejecting trimmed articles.

2. In a machine for the purpose specified, the combination of a frame, a chuck mechanism supported therein comprising a fixed housing, a hollow chuck spindle rotatably mounted in said housing, means for rotating said spindle, a hollow resilient chuck proper mounted within and operatively connected with said chuck spindle so as to rotate therewith, and means for separately delivering articles to be trimmed to said chuck, means for trimming articles held in said chuck, and means for ejecting trimmed articles, the relation being such that delivery of an article to said chuck will automatically effect engagement of said article with said chuck, causing it to rotate therewith.

3. In a chuck for the purpose specified, the combination of a frame, a chuck mechanism supported thereon comprising a fixed housing, a hollow chuck spindle rotatably mounted in said housing, means for rotating said spindle, a hollow resilient chuck proper mounted within said spindle the normal inside diameter of which is less than the outside diameter of an article for operating on which the machine is designed, and means for imparting rotation to said chuck proper with the chuck spindle.

4. The chuck specified in claim 3, in which the chuck proper consists of a ring made of resilient material and is cut through lengthwise.

5. The chuck specified in claim 3, in which the chuck proper consists of a ring made of resilient material cut through lengthwise, and means for imparting rotation thereto in operation consisting of a bushing secured to the chuck spindle a lug on which interlocks with a notch formed in said chuck proper.

6. The chuck specified in claim 3, in which the chuck proper consists of a ring made of resilient material cut through lengthwise, and means for imparting rotation thereto in operation consist-

ing of a bushing secured to the chuck spindle a lug on which interlocks with a notch formed in said chuck proper at the "following" side of the slit therein.

7. The machine specified in claim 1, in which the means for delivering articles to the chuck mechanism comprises a holder for an article to be trimmed and a reciprocable plunger both mounted on the machine frame at the receiving side of and in axial alignment with the chuck spindle, and means for imparting reciprocating movement to said plunger to deliver an article from said holder to the chuck proper and to eject a trimmed article, comprising means for maintaining said plunger yieldingly retracted, and means for advancing said plunger comprising a cam, means for imparting rotation to said cam and operating connection between said cam and plunger, the operating face of said cam comprising sectors operative consecutively, to permit full retraction of the plunger, to advance the plunger to transfer an article from said holder into trimming position in the chuck mechanism, to impart a dwell to the plunger during the trimming operation, and to eject a trimmed article.

8. The machine specified in claim 1, in which the means for delivering articles to the chuck mechanism comprises a holder for an article to be trimmed and a reciprocable plunger both mounted on the machine frame at the receiving side of and in axial alignment with the chuck spindle, and means for imparting reciprocating movement to said plunger to deliver an article from said holder to the chuck proper and to eject a trimmed article, comprising a lever opposite ends of which are pivoted to said plunger and to a yieldingly supported fulcrum, means for oscillating said lever to impart reciprocating movement to said plunger, comprising a spring applied thereto for maintaining said plunger yieldingly retracted, and a cam for turning said lever pivotally against the force of said spring, the relation being such that the fulcrum of the lever will be substantially fixed under normal operating conditions, but will yield under excessive resistance to movement of the plunger permitting said cam to rotate without subjecting parts actuated thereby to extraordinary stresses liable to deform or break them.

9. The machine specified in claim 1, in which the means for delivering articles to the chuck mechanism comprises a holder for an article to be trimmed and a reciprocable plunger both mounted on the machine frame at the receiving side of and in axial alignment with the chuck spindle, and means for imparting reciprocating movement to said plunger to deliver an article from said holder to the chuck proper and to eject a trimmed article comprising a lever opposite ends of which are pivoted to said plunger and to a fulcrum support, means for oscillating said lever to impart reciprocating movement to said plunger, comprising a coil spring applied thereto for maintaining said plunger yieldingly retracted, and means for mounting said spring under compression comprising an anchor member which abuts the end of said spring remote from said lever, fixed plates between which said spring is positioned provided with bayonet slots, and trunnions on said anchor member which interlock with said bayonet slots.

10. The machine specified in claim 1, in which the means for delivering articles to the chuck mechanism comprises a holder for an article to be trimmed and a reciprocable plunger both

mounted on the machine frame at the receiving side of and in axial alignment with the chuck spindle, and means for imparting reciprocating movement to said plunger to deliver an article from said holder to the chuck proper and to eject a trimmed article, comprising a lever opposite ends of which are pivoted to said plunger and to a fulcrum support, means for oscillating said lever to impart reciprocating movement to said plunger, comprising a coil spring applied thereto for maintaining said plunger yieldingly retracted, and means for mounting said spring under compression comprising an anchor member which abuts the end of said spring remote from said lever, fixed plates between which said spring is positioned provided with bayonet slots, and trunnions on said anchor member which interlock with said bayonet slots, said trunnions being arranged at different distances from opposite ends of said anchor member.

11. The machine specified in claim 1, in which the means for delivering articles to be trimmed to the chuck comprises a magazine mounted on the machine frame provided with an opening which extends lengthwise through the same proportioned to receive said articles sidewise and to permit them to fall freely therethrough, an article-holder supported on the machine frame at the lower end of said magazine provided with an opening in a side thereof proportioned and arranged to receive articles from said magazine, said holder being positioned in axial alignment with the chuck, and means for delivering articles from said holder to said chuck.

12. The machine specified in claim 1, in which the means for delivering articles to be trimmed to the chuck comprises a magazine mounted on the machine frame provided with an opening which extends lengthwise through the same proportioned to receive said articles sidewise and to permit them to fall freely therethrough, an article-holder detachably supported on the machine frame at the lower end of said magazine provided with an opening in a side thereof proportioned and arranged to receive articles from said magazine, said holder being positioned in axial alignment with the chuck, and means for delivering articles from said holder to said chuck.

13. The machine specified in claim 1, in which the means for trimming an article held in the chuck comprises a movably supported tool-holder, tool-holding means thereon and means for imparting movement to said tool holder to advance the trimming tool to sever the end of the article to be trimmed, in timed relation with the means for separately delivering articles to and ejecting them from said chuck.

14. The machine specified in claim 1, in which the means for trimming an article held in the chuck comprises a pivoted tool-holder, tool-holding means thereon, and means for imparting oscillating movement to said tool-holder to advance the trimming tool to sever the end of an article held in the chuck, in timed relation with the means for separately delivering articles to and ejecting them from said chuck.

15. The machine specified in claim 1, in which the means for trimming an article held in the chuck comprises a movably supported tool-holder, tool-holding means thereon and means for imparting movement to said tool-holder to advance the trimming tool to sever the end of the

article to be trimmed, in timed relation with the means for delivering articles to and ejecting them from said chuck, comprising a spring applied to said tool-holder adapted to maintain the same yieldingly retracted, an arm on said tool-holder, a rod supported so as to be movable endwise one end of which is secured to said arm, a cam rotatably mounted on the machine frame in operative relation to a relatively fixed abutment on said rod, the relation being such that rotation of said cam will impart movement to said rod endwise to move the tool-holder against the force of the spring applied thereto, thereby advancing the trimming tool to sever the end of the article supported in the chuck.

16. The machine specified in claim 1, the chuck proper of which consists of a ring made of resilient material cut through lengthwise, and the means for mounting said chuck proper within the chuck spindle comprises bushings, one of which is secured to the chuck spindle so as to rotate therewith, and the other of which is confined between the inner end of said driven bushing and an interior shoulder on the chuck spindle, and is provided with a circular recess in which said chuck proper is seated, being confined in position therein between a shoulder at the inner end of said recess and the proximate end of the driven bushing, and driving connection between said driven bushing and the chuck proper causing both thereof to rotate with said chuck spindle.

17. The machine specified in claim 1, the chuck proper of which consists of a ring made of resilient material cut through lengthwise, and the means for mounting said chuck proper within the chuck spindle comprises bushings, one of which is secured to the chuck spindle so as to rotate therewith, and the other of which is confined between the inner end of said driven bushing and an interior shoulder on the chuck spindle, and is provided with a circular recess in which said chuck proper is seated, being confined in position therein between a shoulder at the inner end of said recess and the proximate end of the driven bushing, and driving connection between said driven bushing and the bushing in which the chuck proper is seated and also with the chuck proper whereby they will all rotate with said chuck spindle.

18. The machine specified in claim 1, the chuck proper of which consists of a ring made of resilient material cut through lengthwise, and the means for mounting said chuck proper within the chuck spindle comprises bushings, one of which is secured to the chuck spindle so as to rotate therewith, and the other of which is confined between the inner end of said driven bushing and an interior shoulder on the chuck spindle, and is provided with a circular recess in which said chuck proper is seated, being confined in position therein between a shoulder at the inner end of said recess and the proximate end of the driven bushing, and driving connection between said driven bushing and the bushing in which the chuck proper is seated and also with the chuck proper whereby they will all rotate with said chuck spindle, said driving connection consisting of a lug on said driven bushing which interlocks with notches formed in the other bushing and in the chuck proper.

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