Aug. 22, 1944. A. F. GAGNE, JR 2,356,236

GAUGING DEVICE

Filed Jan. 28, 1943 2 Sheets-Sheet 1

Fig. 1.

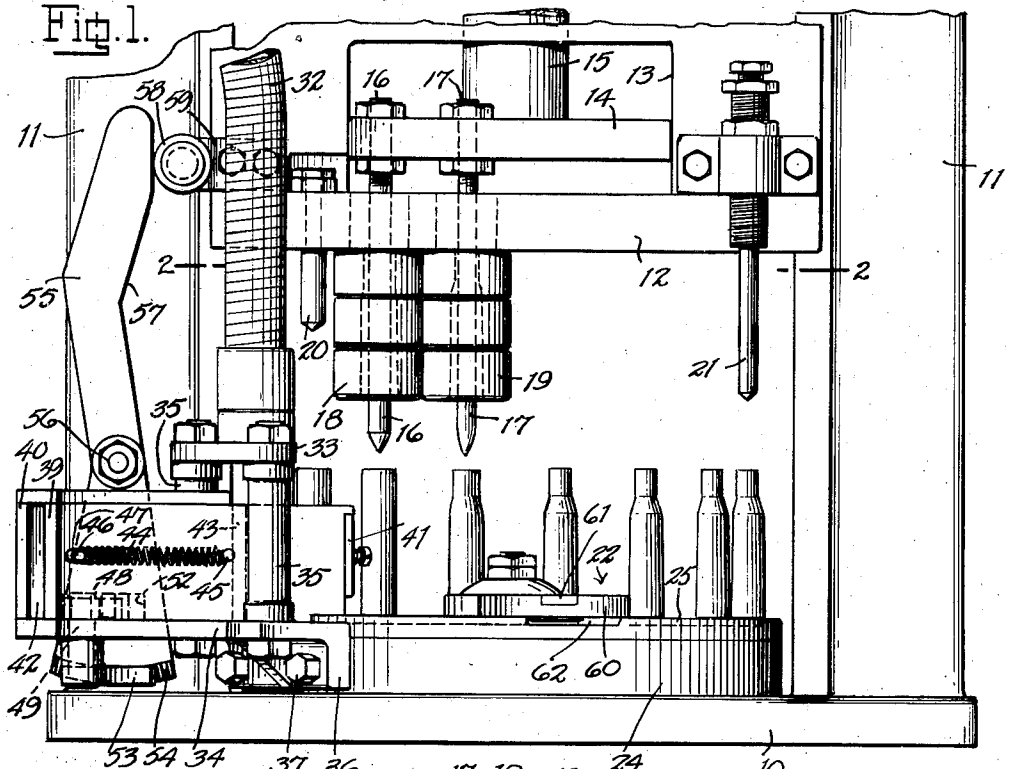


Fig. 2.

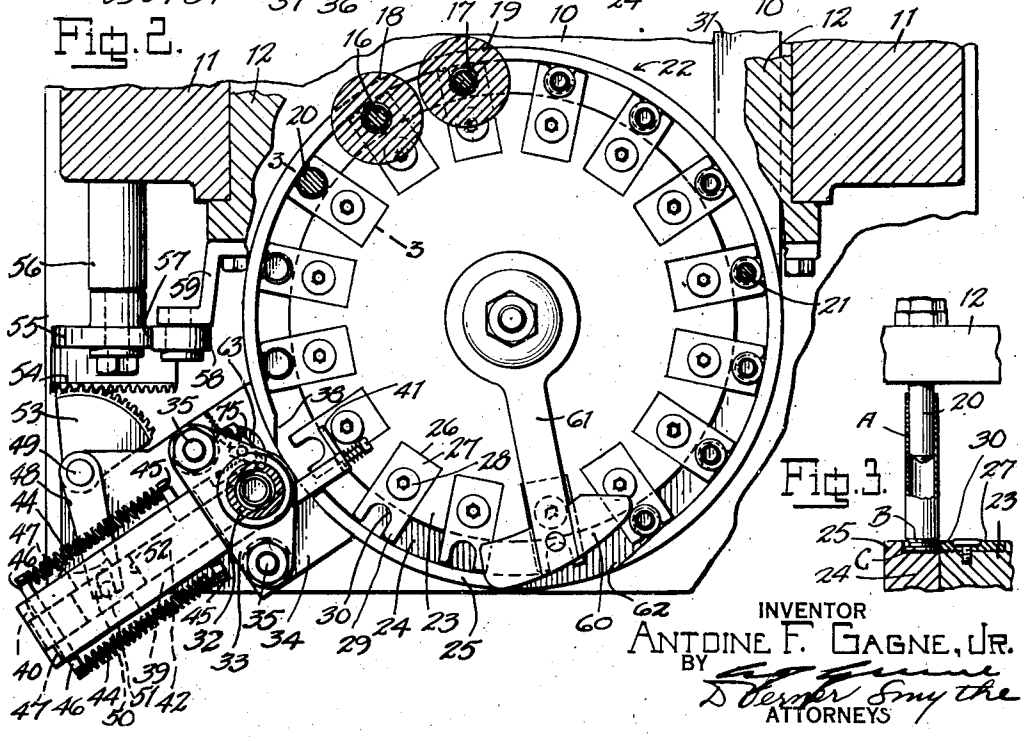


Fig. 3.

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Fig. 4.

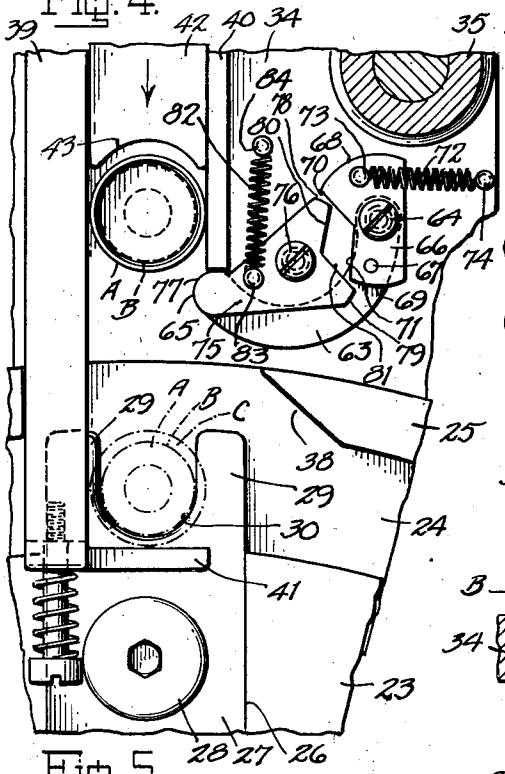


Fig. 7.

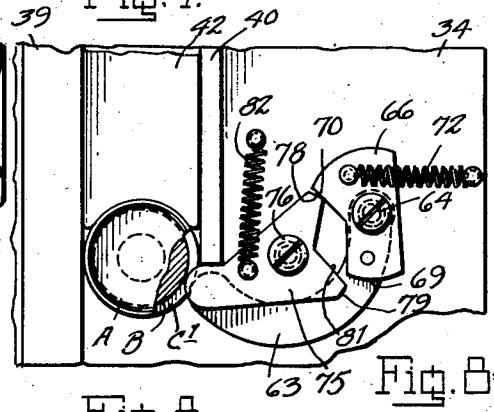


Fig. 8a.

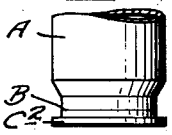


Fig. 8.

Fig. 5.

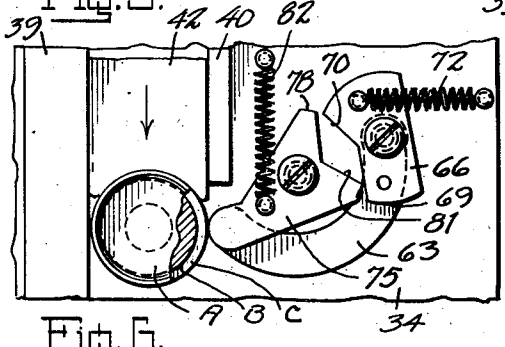


Fig. 9.

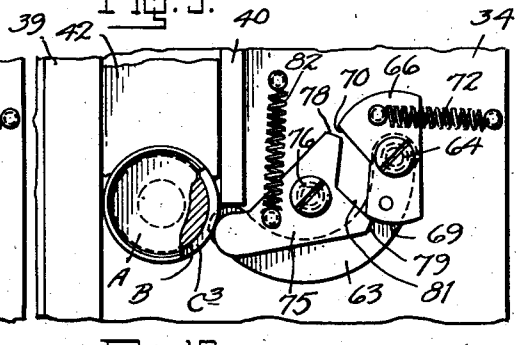


Fig. 6.

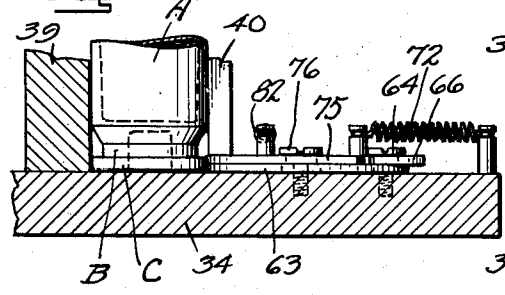
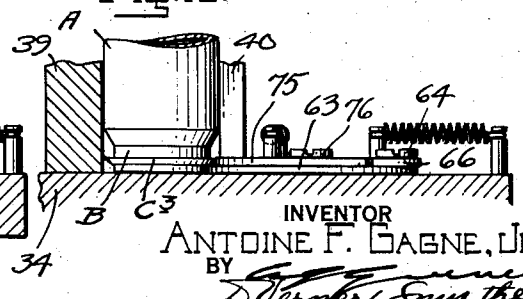


Fig. 10.



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2,356,236

UNITED STATES PATENT OFFICE

2,356,236

GAUGING DEVICE

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Application January 28, 1943, Serial No. 473,825

7 Claims. (Cl. 209—90)

The present invention relates to a gauging device, and particularly a detector and stop gauge adapted to be incorporated in the feed line of a machine for processing articles, whereby substandard articles, failing to meet a predetermined standard form and dimension, are automatically restrained and prevented from entering into the machine. While the gauging device may find application in numerous gauging operations, as will be clear from the disclosure, the exemplary illustration and the following description are concerned with gauging the head thickness of cartridge cases, as the latter are fed from a hopper or other suitable feed means to a processing machine for shaping the cases from cylindrical shape to finished cartridge case shape, wherein the body of the case is tapered, its mouth end contracted, and a tapered neck formed between the body and the mouth end.

The usual tapering press for this purpose, and which is illustrated by way of example in the present disclosure, is a dial feed press having a series of stations at which the articles are engaged by a succession of punches and shaping dies carried in a reciprocating head, certain of these punches adapted to tightly engage the interior of the case for ironing and sizing operations thereon, and certain of the dies adapted to engage the exterior of the case to shape it into its tapered form, these dies including stripping punches having relative movement with respect to the dies to strip the cases from the interior of the dies. During these operations the cases are carried in an indexing carrier plate and each case is held therein by a fork-shaped retaining member engaged in the cannelure or extraction groove of the case, the projecting head flange of the case being engaged beneath the retaining member. During the up-stroke of the press head to remove the punches and dies from the cases the latter are retained in the indexing carrier plate by these retaining members engaging the cannelures of the cases, so that the upward pull upon the cases is only opposed by the projecting head flanges. Consequently an abnormally thin and weakened head flange may distort under this upward pull and fail to retain the case, with the result that the case is pulled out of the carrier plate and is carried upwardly by the press head upon the punch or within the die. As a result the case itself is ruined; and moreover, every additional case which is moved successively beneath the punch or die will be crumpled due to the presence of the unstripped case on the punch or in the die. Also the punches and dies themselves may be bent or broken.

Thin or substandard heads on cartridge cases may result from several causes encountered during the manufacturing steps prior to the feeding of the cases to the tapering press. The grooved head end of the case is formed by feeding the case in a collet into relation with turning and trimming tools, and the thin head shells may result either from defective tools or from improper positioning or slipping of the case in the collet. If the primer pocket should be small or tight, caused by a defective bunter in the pocket forming tools, the case will be driven too far into the head turn machine collet by the locating plunger. The resulting cannelure cut will be too near the head, thus forming a "thin head." Another type of "thin head" may result when the case is located properly in the collet during the first roughing cut, but slips back in a loose collet at the beginning of the finishing cut, so that the flange metal of the head may be cut off entirely or just a thin strip left at the top or the bottom of the head. In one case, there is a thin flange of metal in line with the bottom of the case, while in the other case there is a thin flange of metal spaced upwardly from the bottom of the case and in line with the top of the normal head. It will thus be seen that in certain types of "thin heads" the top or shoulder of the head flange is too close to the bottom, that is lower than the normal shoulder height, while in other types the shoulder is at the normal height from the bottom of the case but its under surface is spaced upwardly leaving an undercut at the bottom of the case.

It is an object of the invention to provide gauging means which will detect and stop "thin heads" of any of these types, passing only those cartridge cases wherein the head flange is of normal height and of full diameter from the bottom of the case to the upper surface or shoulder of the head. To this end it is proposed to provide gauging means including a pair of lever members arranged to engage the periphery of the head flange respectively contiguous to its upper and lower edges, these members being so related that when both of them are actuated by a full height and full diameter head flange they will both move to allow the case to pass in the feed line to the processing machine. However, in the event of failure of one member to move relatively to the other, due to a "thin head" either at the bottom of the case or spaced from the bottom of the case, the one that is moved will interlock with respect to the other before it moves to its releasing point, thus

blocking the feed of the substandard case in the feed line.

Another object of the invention is to provide a gauging device which may be incorporated with facility in known types of processing machines, without appreciable alteration therein.

Other objects, features and advantages of the invention will be set forth in greater detail in the following specification which describes one form of the invention particularly adapted to a specific type of machine. It will be understood, however, that the invention is not limited thereby and moreover includes all modifications within the scope of the appended claims.

In the drawings:

Fig. 1 is a front elevation, partially broken away, of a cartridge case tapering press in which the gauging device of the invention is incorporated.

Fig. 2 is a plan view, partially in horizontal section, showing the indexing carrier plate, the automatic cartridge case feed means, and certain of the processing tools, the latter being shown in horizontal section, taken along the line 2—2 of Fig. 1.

Fig. 3 is a detail vertical sectional view, showing one of the cartridge cases engaged by the mouth ironing punch, just prior to the disengaging up-stroke of the punch.

Fig. 4 is an enlarged fragmentary plan view of the gauging device, according to the illustrated exemplary embodiment of the invention, showing adjacent cooperating parts of the feed slide and indexing carrier plate in relation thereto, the gauging device being shown in its "rest" position before engagement by a cartridge case.

Fig. 5 is a plan view showing the gauging device in its moved position, engaged by a normal full height and full diameter cartridge case head, as the cartridge case passes the gauging device in its feeding movement to the indexing carrier plate.

Fig. 6 is a front elevation of the gauging device and the lower end of the normal cartridge case, as seen in Fig. 5.

Fig. 7 is a plan view showing the gauging device engaged by a substandard cartridge case having a thin head flange adjacent the bottom, the cartridge case being restrained from feeding movement to the transfer dial.

Fig. 8 is a front elevation showing the gauging device and substandard cartridge case, as seen in Fig. 7.

Fig. 8a is a side elevation of another type of substandard case having a thin head flange adjacent the bottom.

Fig. 9 is a plan view showing the gauging device as engaged by a substandard cartridge case in which the thin head flange is spaced from the bottom, the cartridge case being restrained from feeding movement to the indexing carrier plate.

Fig. 10 is a front elevation showing the gauging device and substandard cartridge case, as seen in Fig. 9.

Similar reference characters indicate corresponding parts throughout the several figures of the drawings.

Referring to the drawings and more particularly to Figs. 1 to 3 thereof, the machine chosen to illustrate an exemplary embodiment of the invention is a well-known type of cartridge tapering press widely used in the production of small arms ammunition components, particularly cartridge cases.

Cartridge cases of .30 and .50 caliber are usually formed from a metal blank, such as brass or a harder metal by a series of drawing operations including heat treatments between successive draws until a deep drawn tubular case is formed having a substantially dome-shaped closed end. These cases are trimmed to length and thereafter headed in a series of operations wherein the ends of the cases are flattened and pockets are formed therein for the primer or percussion caps. Further trimming is done and subsequently the cases are fed into a head turning machine which turns a beveled rim and a cannelure or extraction groove on the head end of the cases.

After proper heat treatments, the cases are finally fed from a hopper or other supply source to a suitable tapering press adapted to taper the body and neck portions of the cases. During the tapering operation, which takes place through a series of steps as the cases are fed in an indexing carrier plate or transfer dial into successive relation with the processing stations, each of the cases is supported mouth-end up upon the dial through engagement of a forked retaining member with the extraction groove. It is therefore essential to the proper operation of the press that the head flange of the cartridge case beneath the groove be of full height and full diameter, and consequently of adequate strength, in order to withstand the withdrawing action of the various punches and dies engaged with the cartridge case. In the case of a "thin head" the disengaging force may be sufficient to cause the head flange to bend and become disengaged from the forked retaining member, whereupon it is carried up with the press head, and unless immediately removed will cause considerable damage by engaging and smashing the successive cartridge cases coming into position beneath it. Considerable tool damage is also apt to result.

The present invention is therefore incorporated in the processing machine at a point where the cartridge cases will be gauged before entering the machine, thus preventing cases with substandard thin heads from being fed into the transfer dial. While the invention obviously may be incorporated in various types of machines having various types of feed means whereby cartridge cases or other articles are individually fed, the tapering press illustrated will serve to show the manner in which the invention may be employed in such machines.

The press comprises a horizontal bed 10 mounting an inverted U-shaped frame, the vertical slideway standards 11—11 of which are illustrated, and upon which the reciprocating press head 12 is slidably guided. This press head, which carries certain of the operating tools, as will presently more fully appear, is reciprocated by the usual crank shaft and link arms and carries with it, within a suitable guide opening 13, a stripper plate 14 carrying certain stripper punches, as will presently more fully appear, adapted to have relative movement with respect to the tools carried by the head, this stripper plate being supported on a post 15 and having vertical reciprocating movement relative to the press head 12 through spring, hydraulic, cam or other suitable means as is usual in such machines.

The stripper plate 14 carries a pair of stripping punches 16 and 17, the lower ends of which extend down through passages in the press head 12 and respectively through a pair of taper and mouth forming dies 18 and 19 secured to the press head, the die 18 having a tapered die cav-

ity designed to partially shape the cartridge case and the die 19 having a die cavity designed to finally shape it. At a station of the indexing carrier plate in advance of the tapering die 18 there is mounted in the press head a mouth-ironing punch 20, and at another station following the tapering die 19 there is mounted upon the press head a ball-sizing punch 21.

Beneath the press head 12 upon the bed 10 there is mounted the indexing dial type article transfer means, indicated generally at 22, and which comprises an indexing carrier plate 23 rotatably mounted on a circular table 24 fixed to the bed 10 and having a peripheral upstanding rim flange 25. The periphery of the carrier plate 23 is spaced inwardly from the rim flange 25 to provide a channel way for the cartridge cases, and in equally spaced radial relation the carrier plate is provided with a series of radial recesses 26 in which cartridge case retaining plate members 27 are secured by screws 28, these retaining plates projecting from the periphery of the plate 23 into close proximity to the rim 25 and being of fork-shape to provide a recess 30 and projecting fingers 29—29 at each side to engage within the extraction groove B of the cartridge case A, the undersurface of the projecting fork end being raised above the surface of the table 24 to provide just enough clearance for the entrance of the head flange C of a standard cartridge case.

The cartridge cases are fed from a point of supply into the fingers 29 and are then transferred successively by the indexing carrier plate to the punches and dies, and finally are removed at a discharge point, the carrier plate being intermittently rotated in alternate relation with the reciprocation of the press head by a suitable reciprocating ratchet drive element 31.

The cartridge cases are fed to the transfer dial from a supply hopper or other suitable source through a flexible tube 32 secured at its lower end to a cartridge discharge plate 33 supported in elevated relation above the horizontal feed slide bracket 34 by posts 35—35, the bracket 34 having a mounting base 36 secured to the periphery of the dial bed 24 by bolts 37 in radial line with the feeding station of the indexing carrier plate 23 and opposite an entrance breech 38 in the rim 25.

Upon the bracket 34 there is provided in radial line with the transfer dial and in vertical line with the discharge end of the tube 32 a slideway comprising parallel spaced walls 39 and 40, the wall 39 extending across the breech opening 38 and over the margin of the table 24 and being provided at its end with a resiliently mounted stop plate 41 disposed in back of the recess 30 of the retaining plate member 27. The wall 40 terminates short of the rim of the transfer dial for the purpose of cooperation with the gauging device of the invention, as will hereinafter more fully appear. Within the slideway there is provided a reciprocating feed slide 42, provided at its forward end with a concave cartridge case engaging surface 43 which in the retracted position of the slide is disposed slightly rearwardly of the discharge end of the tube 32, so that a cartridge case drops from the tube in front of the slide, whereupon the slide is advanced to feed the cartridge case into the transfer dial, it being understood that the following cartridge case in the tube drops upon the upper surface of the projected slide and upon its retraction drops into feeding position in front of the slide.

Reciprocation of the feed slide is accomplished by means of springs 44—44 connected between posts 45—45 upon the respective slide walls 39 and 40 and the projecting ends of a pin 46 secured to the rearward end of the slide and extending through slots 47—47 in the respective slide walls, these springs adapted to impart projecting feeding movement to the slide, while retracting movement is imparted by a lever 48, pivotally mounted upon the bracket 34 at 49 and engaged at its forked end 50 with a pin 51 provided in a cut-out 52 of the slide. The lever 48 is provided with a segmental gear 53 meshing with an arcuate gear 54 provided at the lower end of a lever 55, pivotally mounted at 56 upon the side frame 11 of the press, the inner surface of this lever being provided with a cam surface 57 normally engaged with a roller 58 mounted upon a bracket 59 secured to the press head 12.

The slide springs 44 normally retain the lever 55 in engagement with the roller, and the cam surface 57 is such that during the down-stroke of the press head the slide 42 advances in feeding direction under the force of the springs to feed the cartridge case into the transfer dial. However, in the event of any obstruction or restraint in the feed, and such as takes place in connection with the automatic gauging means of the present invention, the press head may continue its downward movement while the lever 55 remains stationary, the roller 58 moving out of engagement with the cam surface. With this arrangement, the feed mechanism will only operate to feed the articles when there is no obstruction or restraint in the feed line, and at the same time the press head may continue its normal operation without danger of jamming or damage to the machine.

Upon completion of the tapering operation upon the cartridge cases, the latter are discharged from the indexing carrier plate into a suitable receptacle by means of a cam block 60, secured upon a fixed arm 61, and disposed in the path of the cartridge cases carried by the indexing table opposite a breech opening 62 in the rim 25 of the table 24, the curvature of the cam block being such that the cartridge cases are moved outwardly from the recesses 30 of the retaining plate members 27 through the breech opening 62 where they drop over the edge of the dial table into the receptacle.

The gauging device, according to the exemplary illustrated embodiment of the invention, is illustrated in detail in Figs. 4 to 10, and is installed upon the upper side of the slide bracket 34 in cooperative relation with the slideway wall 40. The gauging device comprises two cooperating feeler levers, one a lower lever engaging the bracket surface and the other an upper lever engaging the upper side of the lower lever. The lower feeler lever 63 is of arcuate form, and is pivotally mounted at one end upon a pivot stud 64. At its other end it is provided with a rounded feeler surface 65 engaged with the forward abutment end surface of the wall 40 and normally projecting into the slideway in the path of the bottom portion of the projecting head flange of the standard cartridge case. An interlock plate 66 is rigidly secured to the lever 63 by a dowel 67, or by spot welding or other suitable means, and is provided with an upper peripheral surface 68 and a lower peripheral blocking surface 69, both concentric to the swinging axis of the lever 63, the connecting peripheral surface between the inner ends of these concentric surfaces 68 and 69 being of obtuse angular form and com-

prising an upper blocking portion 70 and a lower clearance portion 71. A helical tension spring 72 is connected between a post 73 secured near the upper end of the plate 66 and a post 74 secured to the bracket 34, and normally retains the feeler end of the lever against the end of the wall 40.

The upper feeler lever 75 is mounted upon a pivot stud 76 in raised relation to the bracket 34 so that its lower surface is parallel to and slidable upon the upper surface of the lower feeler lever 63, being provided at its end with a curved feeler surface 77 coinciding with the feeler surface 65 of the lower feeler lever, and normally engaging the end of the wall 40 and projecting into the slideway in the path of the upper portion of the head flange of the standard cartridge case. At the opposite end from the feeler surface 77 there are provided spaced surfaces 78 and 79, concentric to the swinging axis, the surface 78 constituting a blocking surface for the lower feeler lever and being normally disposed in slightly spaced relation to and opposite the blocking surface 70 of the plate member 66. The connecting surface between the surfaces 78 and 79 is of obtuse angular form comprising an upper clearance surface 80 and a lower blocking surface 81, the latter being normally in slightly spaced relation to and opposite the blocking surface 69 of the plate member 66. A helical tension spring 82 is connected between a post 83 of the lever 75 and a post 84 secured to the bracket 34, and normally retains the feeler end of the lever against the end of the wall 40. It will be seen that the combined thickness of the two feeler ends of the levers 63 and 75 corresponds substantially to the thickness of the full height head flange of the standard cartridge case.

In operation a standard cartridge case A having a head flange C, of full height and of full cylindrical profile between its top and bottom surfaces, is fed forwardly in the slideway by the advancing movement of the slide 42, the head flange engaging the feeler surfaces 65 and 77 of the lower and upper feeler levers and causing both levers to swing about their pivot supports, this simultaneous swinging movement causing the blocking surface 78 of the upper lever to move out of the path of the blocking surface 70 of the plate member 66 of the lower lever, and at the same time causing the blocking surface 69 of the plate member to move out of the path of the blocking surface 81 of the upper lever, the clearance surfaces 71 of the plate member and 80 of the upper lever allowing both feeler levers 63 and 75 to swing in counter-clockwise direction. This free swinging of both levers allows the standard shell to be fed through the slideway to the recess 30 of the retaining member of the indexing carrier plate where the retaining fingers 29 engage the extraction groove B above the head flange C, as shown in dot-and-dash lines in Fig. 4.

In the case of the feeding of a substandard cartridge case having a too thin head flange C^1, at the bottom of the cartridge case, as shown in Figs. 7 and 8, the upper feeler lever 75 is out of the path of the flange and in the path of the extraction groove B, while the lever 63 is in the path of the thin head flange. Consequently, the upper feeler lever is not moved, but the lower feeler lever 63 has a limited swinging movement, determined by the slight clearance between the blocking surface 78 of the upper lever and the blocking surface 70 of the interlock plate 66 of the lower lever, these blocking surfaces coming into contact with each other and preventing further swinging movement, as shown in Fig. 7. This swinging movement is insufficient to clear the full diameter of the cartridge case, and consequently the feed of the cartridge case is restrained, the interlocking arrangement between the two feeler levers being such as to provide a positive rigid block to the feed of the cartridge case, as well as to the advancing movement of the feed slide 42 under the force of the springs 44. At the same time, the swinging movement of the press head actuated lever 55 will stop, but the press head will be permitted to continue its normal operation, the lever actuating roller 58 moving out of contact with the cam surface 57, and the feed slide being thereafter retracted as the press head completes its up-stroke and the roller 58 again contacts the cam surface 57.

It will be noted that the arrangement of the several blocking surfaces of the feeler levers with respect to the swinging axes is such that the lines of action pass substantially through the pivotal centers, and consequently there is no tendency for cam slippage between the feeler levers under the pressure of the slide actuating springs, thus insuring a rigid positive blocking of the feed of the substandard cartridge case.

In Fig. 8^a there is illustrated another type of too thin head flange, in which the extraction groove B is cut in normal position but through slippage after the roughing cut the finishing cut has produced a thin head flange C^2 at the bottom of the case. This type of thin head case will be detected and restrained in the same manner as the type illustrated in Fig. 8.

In Figs. 9 and 10 the operation of the device is illustrated in connection with a third type of too thin head flange, the upper surface of the head flange C^3 in this case being at standard height from the bottom of the case, but the undersurface being spaced upwardly from the bottom so that the periphery of the head is undercut. The lower feeler lever 63 is out of the path of the head flange and in the path of the undercut adjacent the bottom surfaces of the case, while the upper feeler lever 75 is in the path of the thin head flange C^3, so that as the case is advanced by the feed slide, the lower lever remains stationary, while the upper lever has a limited swinging movement, determined by the slight clearance between the blocking surface 81 of the upper lever and the blocking surface 69 of the interlocking plate 66, these blocking surfaces coming into contact with each other to prevent further swinging movement of the upper lever, as shown in Fig. 9. As this swinging movement is insufficient to clear the full diameter of the cartridge case the feed of the case is restrained through the rigid interlocking relation of the upper and lower levers.

The form of the invention illustrated in the drawings, and described herein is typical and illustrative only, and it is evident that the invention is capable of embodiments in other forms, all falling within the scope of the appended claims.

What is claimed is:

1. In a gauging device for gauging the diameter and profile form of articles in a feed line, a pair of movably mounted article engaging members each including an integral feeler portion, said feeler portions being adapted normally to extend into the feed path of said articles and respectively engage different portions of the profile, said members each being movable out of said

feed path, and blocking means cooperatively related to said members adapted to enable movement of one of said members independently of the other and to limit the independent movement of said members such that the feeler portion of one member still extends into said feed path, said blocking means being rendered inoperative upon the simultaneous movement of both of said members, whereby the feeler portions thereof are movable out of said feed path to allow the passage of an article in the feed line.

2. In a gauging device for gauging the diameter and profile form of articles in a feed line, a pair of movably mounted article engaging members disposed in vertically spaced parallel planes parallel to the direction of feed of said articles and each including an integral feeler portion, said feeler portions being normally disposed in superposed relation in the feed path of said articles and respectively engageable with portions of the profile disposed in vertically spaced planes, said members each being movable out of said feed path, and blocking means cooperatively related to said members adapted upon movement of only one of said members to limit its movement to a point still in said feed path, said blocking means being rendered inoperative upon the simultaneous movement of both of said members, whereby they are both movable out of said feed path to allow the passage of an article in the feed line.

3. In a gauging device for gauging the diameter and profile form of articles in a feed line, a pair of movably mounted article engaging members each including a feeler portion, said feeler portions being in superposed relation and adapted normally to extend into the feed path of said articles and respectively engageable with different portions of the profile, spring means connected to each member to yieldably retain its feeler portion in normal relation in said feed path, said feeler portions each being movable out of said feed path under the force of an article being fed, and blocking means cooperatively related to said members adapted upon movement of only one of said members to limit the movement of its feeler portion to a point still in said feed path, said blocking means being rendered inoperative upon the simultaneous movement of both of said members, whereby the feeler portions thereof are both movable out of said feed path to allow the passage of an article in the feed line.

4. In a gauging device for gauging the diameter and profile form of articles in a feed line, a pair of pivotally mounted article engaging lever members having spaced vertical axes and each including a feeler portion, said feeler portions being normally disposed in superposed relationship in the feed path of said articles and respectively engageable with different portions of the profile, said feeler portions each being movable out of said feed path, each of said lever members having a blocking portion disposed in the path of swinging movement of a blocking portion of the other lever member, each blocking portion being normally spaced from the other to enable movement of one of said members independently of the other and to limit the independent movement of said members such that the feeler portion of one of said members still extends into said feed path, said blocking portions being movable out of blocking relation upon the simultaneous movement of both of the feeler portions thereof, whereby said members are both movable out of said feed path to allow the passage of an article in the feed line.

5. In a gauging device for gauging the diameter and profile form of articles in a feed line, a pair of pivotally mounted article engaging lever members having spaced pivotal axes and each including a feeler portion normally disposed in the feed path of said articles and respectively engageable with different portions of the profile, said members each being movable out of said feed path, each of said lever members having a blocking portion disposed in the path of swinging movement of a blocking portion of the other lever member and normally spaced therefrom whereby upon movement of only one of said members its movement is limited to a point still in said feed path, said blocking portions being movable out of blocking relation upon the simultaneous movement of both of said members, whereby said members are both movable out of said feed path to allow the passage of an article in the feed line, the force lines of said blocking portions passing substantially through the pivot axes of said lever members.

6. In a gauging device for gauging the diameter and profile form of the heads of cartridge cases in a feed line, a pair of movably mounted cartridge case head engaging members each including a feeler portion, said feeler portions being superposed and adapted normally to extend into the feed path of said cases and respectively engage different portions of the cartridge case head profile, said members each being movable out of said feed path, and blocking means cooperatively related to said members adapted upon movement of only one of said members to limit its movement to a point still in said feed path, said blocking means being rendered inoperative upon the simultaneous movement of both of said members, whereby they are both movable out of said feed path to allow the passage of a cartridge case in the feed line.

7. In combination, a cartridge case processing machine wherein a forked retainer engages the extraction groove of the case above the head, a feed mechanism for feeding the cartridge cases along a feed line to said retainer, and a gauging device for gauging the diameter and profile form of said heads in said feed line, comprising a pair of movably mounted cartridge case engaging members each including a feeler portion normally disposed in the feed path of said cases and respectively engageable with different portions of the cartridge case head profile, said members each being movable out of said feed path, and blocking means cooperatively related to said members adapted upon movement of only one of said members to limit its movement to a point still in said feed path, said blocking means being rendered inoperative upon the simultaneous movement of both of said members, whereby they are both movable out of said feed path to allow the passage of a cartridge case in the feed line.

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