March 21, 1944. J. E. FERGUSON 2,344,930

MARKING MACHINE

Filed Dec. 15, 1941 3 Sheets-Sheet 1

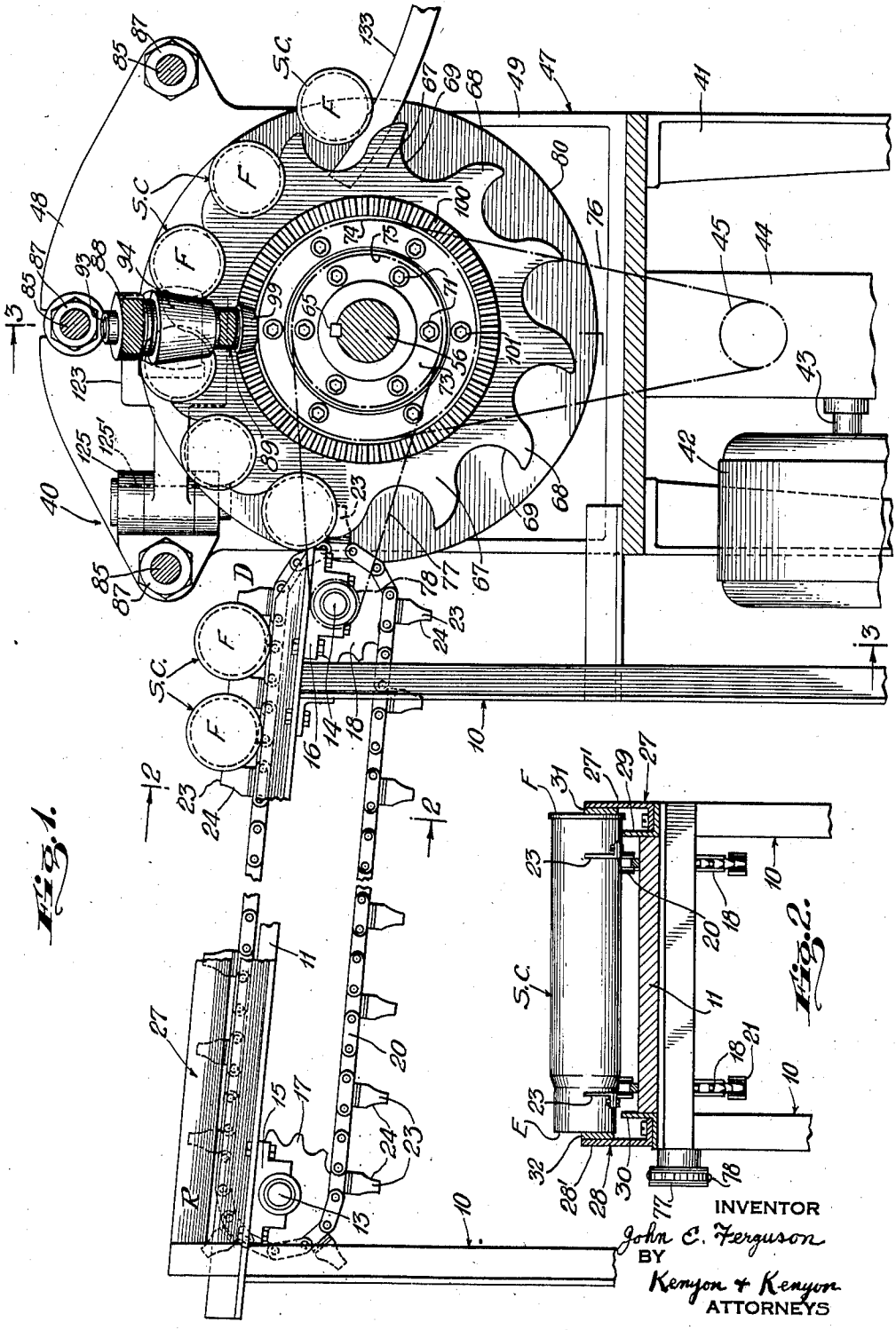

Fig. 1.

Fig. 2.

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Fig. 3.

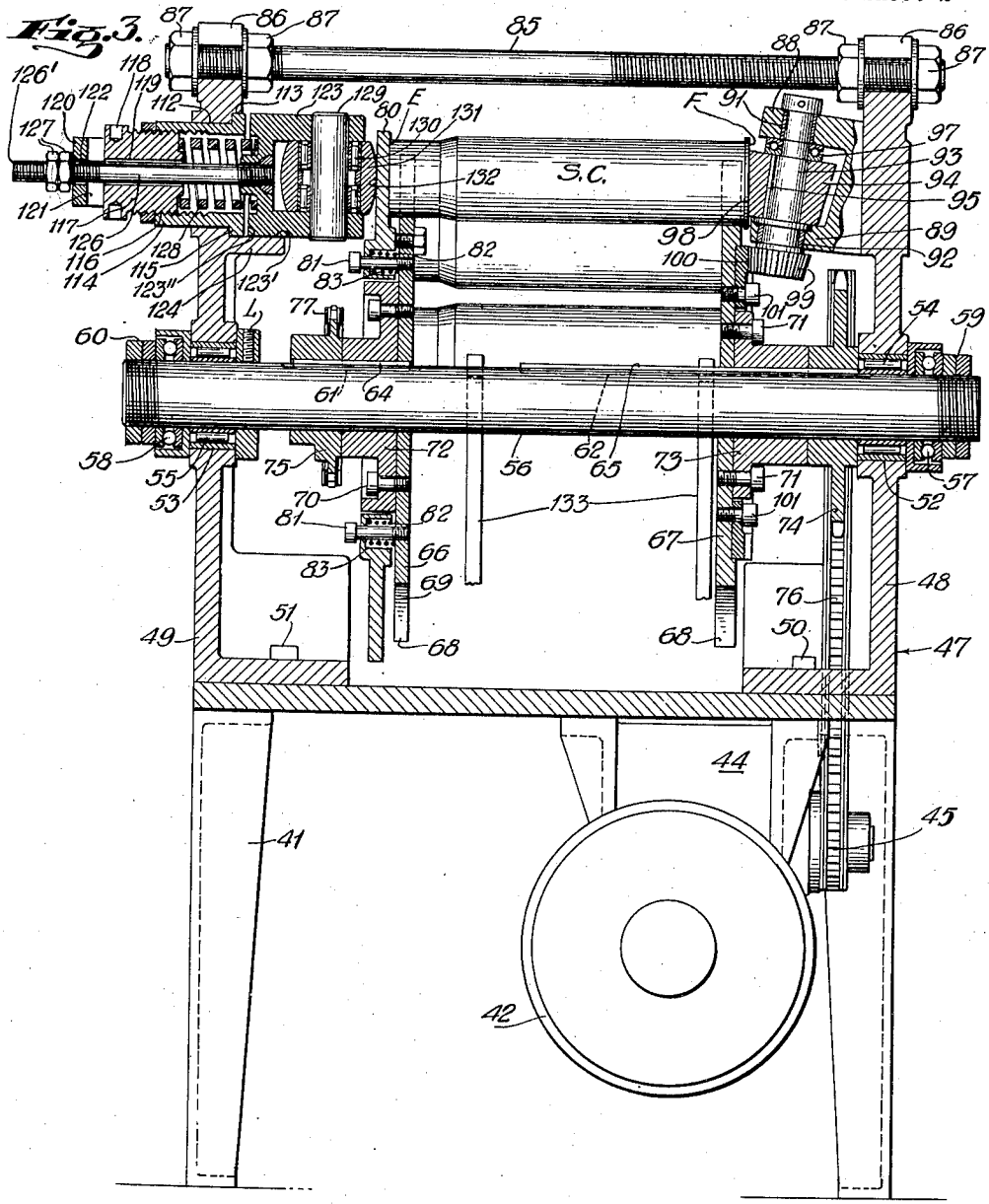

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Fig. 4.

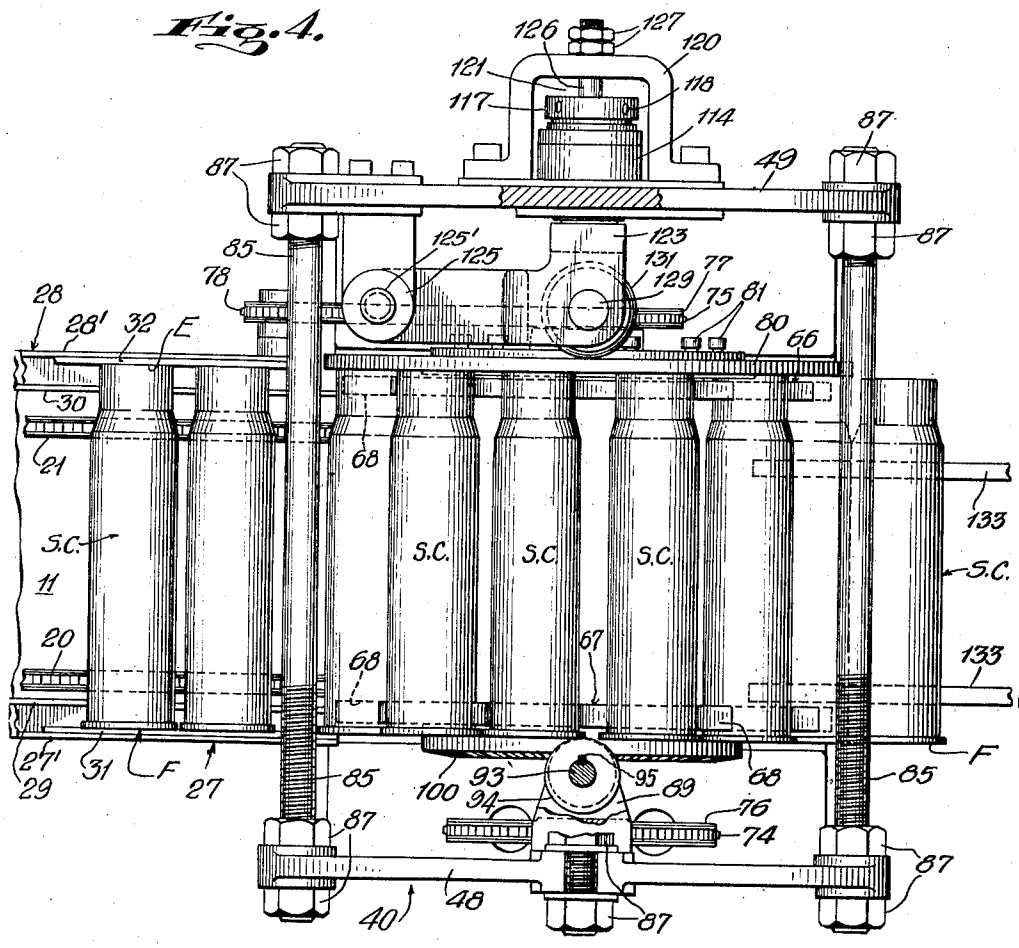


Fig. 7.

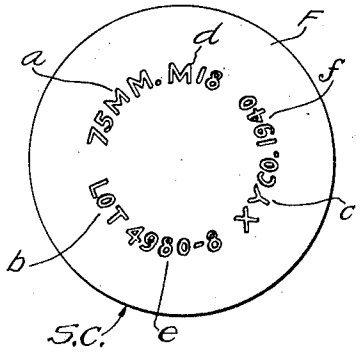


Fig. 5.

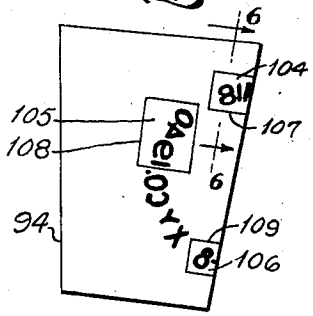
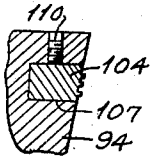


Fig. 6.



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Patented Mar. 21, 1944 2,344,930

UNITED STATES PATENT OFFICE

2,344,930

MARKING MACHINE

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Application December 15, 1941, Serial No. 422,941

9 Claims. (Cl. 101—37)

This invention relates to marking apparatus and more particularly to a machine for marking shell casings or the like with indicia.

In the large-scale production of ordnance equipment, such as shells or shell casings, each piece must be properly marked for example, for identification as to use, source, lot number, and otherwise, so that it can be quickly allocated for use in the field, and traced for source and the like. Where high speed of production exists and is essential, manual marking of each piece is not practicable because of its slowness among many reasons.

It is an object of the present invention to provide effective automatic marking means for each piece which may be located at a convenient point in the production line, and which will serve to mark the piece with appropriate and required indicia without interfering with the general production rate of the pieces.

Another object of the invention is to provide marking means that may be readily and quickly altered whenever necessary without extensive stoppages of the machine.

Still another object of the invention is to provide novel means for applying the markings without subjecting the pieces to impact shocks.

Yet another object of the invention is to provide means for applying the marking without requiring reciprocatory movement of the marking die.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, this invention consists in the novel construction and arrangement of parts, hereinafter described and then sought to be defined in the appended claims, reference being had to the accompanying drawings forming a part hereof, and which show, merely for the purposes of illustrative disclosure, a preferred embodiment of the invention, it being expressly understood, however, that various changes may be made in practice without digressing from the inventive idea.

In the drawings, in which similar reference characters denote corresponding parts,

Fig. 1 is a vertical sectional elevation of the machine;

Fig. 2 is a transverse cross-section taken along line 2—2 of Fig. 1 and viewed in the direction of the arrows;

Fig. 3 is a transverse cross-section taken along line 3—3 of Fig. 1 and viewed in the direction of the arrows;

Fig. 4 is a top plan view partially in section of the device of Fig. 1;

Fig. 5 is an elevational view of the indicia impressing member of the machine;

Fig. 6 is a sectional view taken along line 6—6 of Fig. 5 and viewed in the direction of the arrows;

Fig. 7 is a bottom plan view of a shell casing upon which the indicia have been impressed.

Referring to the drawings, 10 denotes a frame or support having a top 11 sloping downwardly from its receiving end R to its delivery end D. Extending transversely of the frame and below said top are a pair of rotatable sprocket axles 13 and 14. These axles respectively are supported in bearings 15, 16 suitably fastened to the table top 11, or to other suitable portions of the support. The axles 13 and 14 each carry a pair of sprocket wheels respectively designated by the reference numerals 17 and 18. The sprocket wheels on each axle are spaced apart being located at opposite sides of the frame 10, and a wheel of each pair 17 is in alignment with the corresponding wheel of the other pair 18.

Endless chains 20 and 21 are supported respectively on the sets of aligned sprocket wheels 17 and 18. Each of the chains 20 and 21 carries a plurality of angle clips or engaging members 23. These members 23 extend transversely, normal to the surface of the chain to which they are attached, and are uniformly spaced on each of said chains. The side edges of these members are arcuately recessed at 24 and the spacing between members is such that a shell casing S.C., or the like, will be engaged snugly between any corresponding pair of members 23 of each chain, and also rests on the top surface of the chain links between said pairs of members 23.

A pair of upright guides 27, 28 are provided. These guides are mounted respectively along opposite sides of the table top 11 and extend parallel to the conveyor chains 20 and 21. The guides 27, 28 have the outer upright flanges 27', 28' whose heights are so admeasured as to extend at least to the center line of a transversely supported shell casing S.C. Auxiliary upright flanges 29 and 30 extend parallel to said flanges 27' and 28', but only to a height equal substantially to that of the conveyor chains 20, 21 above the top of table 11. The shell casing S.C. is thus slidably guided along the top edge of flange 29 at least as it is moved by the chains 20, 21.

Spacing bars 31, 32 are carried by the respective flanges 27', 28'. These bars are so admeasured in thickness that the opposite ends E and F of the casings S.C. slidably fit between

them as the latter are moved over the table top 11 by the conveyor chains 20, 21.

The shell casings are normally adapted to be fed by hand to the conveyor chains 20 and 21 at the receiving end R of the table top 11.

Take-off mechanism 40 is provided at the delivery end D of the conveyor chains to remove the shell casings S.C. from the conveyor and deliver them continuously at a controlled rate to the indicia impressing mechanism to be presently described.

This take-off mechanism comprises a frame 41. This frame carries on suitable supports a driving motor 42, whose shaft 43 is connected to a suitable gear reducer 44. The output shaft of the latter carries a driving sprocket gear 45 which serves, as will be presently described, to drive all moving parts of the apparatus.

An auxiliary frame 47 is carried by the frame 41. The auxiliary frame comprises the respective upright end brackets 48, 49 secured respectively at 50, 51 to the frame 41. These uprights, or end brackets, are provided with axially-aligned bearing openings 52, 53 which, in turn, are fitted with bearings 54, 55 carrying the transversely-extending shaft 56. The latter is locked against longitudinal displacement by the thrust bearings 57, 58 and the locking nuts 59, 60. It may be shifted longitudinally by adjustment of these nuts and the locking collar L.

The shaft 56 is splined at 61 and 62, the latter splining being longer than the first, and fitted with keys 64, 65. Take-off wheels 66, 67 are carried on the shaft being keyed respectively to keys 64 and 65. The take-off wheels each have respectively the teeth 68 located at regular intervals around each circumference. The teeth have hook-like shape and the spaces 69 between are curved arcuately to receive and nest a shell casing S.C. removed by the teeth from the conveyor chains 20, 21. The teeth on one wheel are radially aligned with corresponding teeth on the other wheel.

The take-off wheels 66, 67 are attached respectively by bolts 70, 71 to the keyed wheels 72, 73. A sprocket gear 74 is keyed to the shaft 56 on key 65. A second sprocket gear 75 is keyed to shaft 56 on key 64. The gear 74 is connected by an endless chain 76 with the driving sprocket gear 45.

Gear 75 is connected by an endless chain 77 with a sprocket gear 78 carried on and keyed to shaft 14. In this way power from the motor serves to drive the take-off wheels 66, 67 and the conveyor chains 20, 21. Both are driven continuously and the surface speed ratios of the chains and take-off wheels is such that a shell casing is delivered to and taken up by each set of teeth 68 as they arrive under the shell casing at the delivery end D of the conveyor chains. The individual shell casings taken up by the teeth of the take-off wheels 66, 67 are moved to an impression-applying position and from there to a delivery chute or conveyor. It is necessary in this movement to guide the open ends E of these casings. A guide ring 80 is provided for this purpose. This ring fits loosely about the circumferential edge of the wheel 72 and is loosely attached to wheel 67 by headed bolts 81. Suitable springs 82 surrounding these bolts and lying within recesses 83 serve to urge the ring 80 away from wheel 66 to the limit permitted by the heads on said bolts 81. The guide ring 80 is thus yieldable and rockable, in fact, self-adjustable for a purpose to be presently described.

The upright end plates 48 and 49 are rigidly spaced with respect to each other by the cross or tie rods 85 which extend between them and through longitudinally aligned openings 86 in said plates. The said rods are adjustable by reason of their respective positioning nuts 87.

Parallelly-extending spaced bearing brackets or flanges 88, 89 are provided on the end plate 48. These flanges extend inwardly of said plate and are provided with the axially-aligned bearings 91, 92 for a spindle 93. The axis of this spindle is arranged at an angle with the vertical. A tapered impression roller 94 is keyed at 95 to the spindle. A suitable thrust bearing 97 prevents longitudinal displacement of this roller. The angular arrangement of the spindle 93 with respect to the roller 94 is such that the innermost portion of the roller 94 at 98 is always substantially vertical or parallel to the face of the end F of the shell casing S.C.

The spindle 93 has a bevel spur gear 99 suitably fixed thereto. This gear in turn meshes with an annular bevel gear 100 which is suitably attached to the take-off wheel 67 by the bolts 101, being concentric with the axis of the said wheel. Thus, in the ratio of gears 99 and 100, rotation of wheels 67 will impart rotation to the spindle 93 and, consequently, to the impression roller 94.

The impression roller 94 is provided on its tapered face with indicia dies 102. These include both permanent and removable indicia impression dies. The permanent portions, such, for example, as the size indicia *a*, the word "lot" *b*, and the manufacturer's name *c*, may be protruding die characters formed reversely on the surface of the impression roller at A, B and C. The changeable indicia, for example, the government numerical designation *d*, the lot number *e*, and the date of manufacture *f*, are each provided on removable die blocks 104, 105, 106, which may be positioned within receiving recesses 107, 108, 109, by suitable set screws 110.

The arrangement both of the permanent indicia and the changeable indicia with respect to the surface of the roller 94 is such that each complete revolution of said roller 94 during the rotation of the take-off rollers 66, 67 the pitch of a single tooth 68, will bring the roller mounted impression indicia into proper impressing position on the face F of the shell casing S.C. to impress by rolling such indicia into the surface in the manner indicated by Fig. 7.

The necessary pressure for causing the impression is provided at the opposite end E of the casing. The end plate 49 is provided with an opening 112 in axial alignment with the axis of the uppermost shell casing S.C. This opening is recessed at 113 and a sleeve 114 is fitted within the opening. The sleeve has an annular flange 115 which then rests in said recess 113. The sleeve is internally threaded at 116 and receives threadedly a threaded adjustment plug 117 which is provided with tool-engaging means 118 and an axial bore 119. A yoke 120 overlies the plug 117 being spaced therefrom at 121. This yoke has an opening 122 in axial alignment with the bore 119.

A forked yoke member 123 having a flat face 123' is provided. The face 123' is adapted to rest slidably on a flange 124 extending from said end plate 49. The member is pivotally supported at 125 from said plate 49 for rotation about the vertical spindle 125'. A guide rod 126 extends from said member 123 through the bores 119 and 122.

The rod is threaded at 126' to receive the locking nuts 127. A heavy compression spring 128 surrounds the rod 126 and extends between the opposing faces of plug 117 and member 123 serving to urge the yoke member 123 away from plug 117 to the limit permitted by the locking nuts 127. Adjustment of plug 117 regulates the pressure of spring 128.

A vertical spindle 129 extends between the tines of the yoke member 123. This spindle carries on roller bearings 130 a roller 131 which has a convex rolling surface 132 which is maintained in rolling contact with the guide plate 80 by the action of spring 128. Movement of the yoke member 123 in opposition to the spring 128 is limited by the abutment of its end 123'' with the annular flange 115. The connection between rod 126 and yoke 123 is of such a nature as to allow for slight arcuate motion of member 123.

Thus, as each shell casing S.C. is moved by the take-off rollers 66, 67 to the position shown in Fig. 3 between the impression roller 94 and pressure roller 131, the impression indicia on roller 94 bear on the face F of said shell casing, and pressure from roller 131 on plate 80 and thence on end E of the shell casing under action of spring 128, is sufficient to cause the die indicia on roller 94 to make a permanent impression by being rolled into the face F of the shell casing. The entire impression is not made simultaneously, but is impressed sequentially by rolling as the shell casing is moved through the zone between the two rollers 94 and 131. Both rollers rotate at the same surface speed as that of surface F and in consequence the indicia are rolled into said surface from the roller 94 as the latter rotates.

The thus marked shell casings are carried beyond the impression zone by the continued movement of the take-off wheels 66, 67 and delivered to a gravity delivery chute or conveyor 133.

It is clear that the motor 42 serves as a common drive means for all the moving parts. The gearing ratio of sprocket gears 45 and 74 and sprocket gears 75 and 78 is such that the speed of the take-off wheels 66, 67 and their teeth 68 is such as to take off in succeeding pairs of teeth 68 the successive shell casings S.C. delivered by the conveyor chains 20, 21. Likewise, the gearing ratio between gears 99 and 100 is such as to give the impression roller 94 a surface speed at its tangent contact with surface F equal to that of the speed of said surface F of the shell casing S.C. as the latter is moved past said roller 94 by the take-off wheels 66, 67.

In operation, the shell casings S.C. are placed by hand on the conveyor chains 20, 21 between pairs of angle clips 23. The conveyor chains move the shell casings along the table 11 between guide flanges 27', 28' to the delivery end D at which point each shell casing in turn is taken off by a pair of take-off teeth on the rotating take-off wheels 66, 67. These teeth carry the shell casings one by one between the yieldable guide plate 80 adjacent the pressure roller 131 and the die or impression roller 94, subjecting them there to the pressure of spring 128 to cause impression in the surface F of each shell casing of the die indicia by a rolling action. The yieldability of guide 80 permits the full pressure from spring 128 to bear on the casing end E. The impressed shells are then carried further with the rotation of the take-off wheels 66, 67 to the delivery chute or conveyor 133 whence they roll out of engagement with teeth 68 and are moved away from the apparatus on said conveyor or chute.

It is to be noted that pressure alone and no impacts are utilized for impressing the indicia upon the shell casing F. There is continuous motion, and, since the impression roller 94 actually rolls the impression into the casing end F, sharper impressions are made without requiring any provision to make an impression die carriage move in the direction of movement of the traveling shell casing.

It is obvious that the apparatus disclosed is capable of use for marking other products besides shell casings. For example, closed-ended cylinders, solid rods, and many other products may be similarly marked, it being necessary in each instance only to adjust the relative distance between take-off rollers 66, 67 and between the pressure roller 131 and roller 94.

It is to be noted that by tapering roller 94, its surface speed is equal to that of surface F throughout the radial line of tangent contact between the two moving surfaces.

While specific embodiments of the invention have been described, various modifications within the scope of the claims is contemplated. There is no intention of limitation to the exact details shown and described.

What is claimed is:

1. In apparatus of the character described, rotatable indicia impressing means arranged to engage a surface on an end of a moving body, means for rotating and imparting a surface speed to said indicia impressing means equal substantially to that of said surface of said moving body, means for moving said body surface past said indicia impressing means, guide means yieldably carried by said moving means, and engageable with the opposite end of said body, and spring actuated means engaging said guide means to press said surface of said body against said indicia impressing means with sufficient pressure to secure an impression of its indicia upon said surface by a rolling action.

2. In apparatus of the character described, rotatable indicia impressing means arranged to engage tangentially a surface on an end of a moving body, means for rotating and imparting a surface speed to said indicia impressing means along the points of tangency equal to that of said surface of said moving body, means for moving said body surface past said indicia impressing means, a guide member yieldably carried by said moving means and engageable with the opposite end of said body and spring-actuated means engaging said guide member to press said surface of said body against said indicia impressing means along the points of tangency with sufficient pressure to secure a rolled-in impression of its indicia upon said surface, and means for delivering bodies to said moving means.

3. In apparatus of the character described, a rotatable roller, a second rotatable roller opposite the one first named and spaced therefrom, indicia dies on said first-named roller, a guide member yieldably carried in the space between said rollers high pressure means in association with said second-named roller urging it continuously against said guide member and toward said first-named roller, means for delivering a body to be marked between said first-named roller and said guide member and past the first-named roller with a surface on said body to be marked in pressing engagement against said

first-named roller, and means for so rotating said first-named roller as to give its surface a speed equal to that of the surface of said body moving past it whereby the indicia dies upon said first-named roller will roll indicia into said surface.

4. In apparatus of the character described, a rotatable roller, a second rotatable roller opposite the one first named and spaced therefrom, indicia dies on said first-named roller, a guide member yieldably carried in the space between said rollers, spring actuated high pressure means in association with said second-named roller urging it continuously against said guide member and toward said first-named roller, means for delivering a body to be marked between said first-named roller and said guide member and past said first-named roller with a surface on said body to be marked in pressing engagement against said first-named roller, means for so rotating said first-named roller as to give its surface a speed equal to that of the surface of said body moving past it whereby the indicia dies upon said first-named roller will roll indicia into said surface, and means for adjusting the tension of the spring of said high pressure means to vary the pressure exerted by said second-named roller against said guide member.

5. In apparatus of the character described, a rotatable tapered roller, a second rotatable roller opposite the one first named and spaced therefrom, removable indicia dies on said first-named roller, a guide member yieldably carried in the space between said rollers and in rolling contact with said second-named roller, high pressure spring-actuated means in association with said second-named roller urging it continuously against said guide member and toward said first-named roller, rotatable means for delivering a body to be marked between said first-named roller and said guide member and past said first-named roller, with a surface on an end thereof to be marked in pressing engagement against said first-named roller, said guide member being carried by and rotatable with said delivering means, means for so rotating said first-named roller as to give its surface a speed equal to that of the surface of said body moving past it whereby the indicia dies upon said first-named roller will roll indicia into said surface, means for supporting said first-named roller so that the line of tangency between it and said surface moving past it is substantially vertical, and means for adjusting the said spring-actuated means to vary its pressure.

6. In apparatus of the character described, a tapered rotatable roller supported on a biased spindle, whose angle is sufficient to maintain the surface of said roller substantially vertical at one side thereof, indicia dies on the surface of said roller, a second roller opposite the vertical surface of said first-named roller, and spaced apart therefrom, a pivotally supported yoke member for carrying said second roller, spring means tending to urge said yoke and its supported roller towards said tapered roller, means for varying the tension of said spring means, a yieldably supported ring member in rolling contact with said second roller, means for delivering a body having a surface to be marked between said ring member and said tapered roller and past the latter with its said surface facing said first-named roller and in tangent contact therewith, said ring member being carried by and movable with said body delivering means, and means for rotating said first-named roller as to give its surface a speed equal to that of the surface of said body moving past it at the tangency whereby said indicia dies will roll indicia into said surface of said body.

7. In apparatus of the character described, a tapered roller, marking indicia carried on said roller and projecting from the tapered surface, means for rotatably supporting said roller so that one portion of its tapered surface is substantially vertical, a second roller rotatably supported opposite said tapered roller in spaced relationship therewith, a guide member yieldably supported adjacent to said second roller and in surface contact therewith, means for moving a body having a vertical end face between said guide member and the vertical portion of said tapered roller, with said end face in contact with said vertical portion, spring means acting on said second-named roller to press the latter against said guide member, and said guide member against the opposite end of said body whereby said end face is pressed against said vertical portion of said tapered roller, and means for rotating said tapered roller so that its tapered surface has a surface speed equal to that of the end face of said moving body whereby said marking indicia are rolled into said end face.

8. In apparatus of the character described, a rotatable tapered roller, a biased spindle for supporting said roller whose angle is sufficient to maintain a surface of said roller substantially vertical at one side thereof, removable indicia dies carried by said roller, a pivotally supported yoke member adapted to swing on a vertical axis toward and away from said roller, a crowned roller rotatably supported by said yoke member opposite the vertical surface of said tapered roller and spaced apart therefrom, adjustable spring means for urging said yoke member toward said tapered roller, a yieldable ring in rolling contact with said crowned roller, means for moving a body having a surface to be marked between said ring and said tapered roller and past the latter and with its said surface facing said tapered roller and in tangent contact therewith, said yieldable ring member being carried by said moving means, and means for rotating said tapered roller so as to give its surface a speed equal to that of the surface of said body moving past it at the tangency whereby the pressure exerted by said spring will cause said indicia dies to roll indicia into the said surface of said moving body.

9. In a marking apparatus having means for impressing indicia upon end surfaces of moving tubular bodies, means for moving said bodies past said indicia impressing means, said moving means comprising spaced-apart discs, a shaft to which said discs are splined, each of said discs having teeth located at regular intervals around their circumferences, said teeth having hook-like shape with arcuately curved spaces between adjacent pairs of teeth, each of said spaces being adapted to receive and nest one of said bodies, a guide member yieldably supported by one of said disc members for guiding an end of each of said bodies, and means for rotating said shaft whereby said discs will successively and positively move each of said bodies past said indicia impressing means.

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