Feb. 26, 1935. J. S. McNAIR 1,992,537

MACHINE AND METHOD FOR MAKING PACKING INTEGERS

Original Filed June 24, 1933 2 Sheets-Sheet 1

Fig. 1.

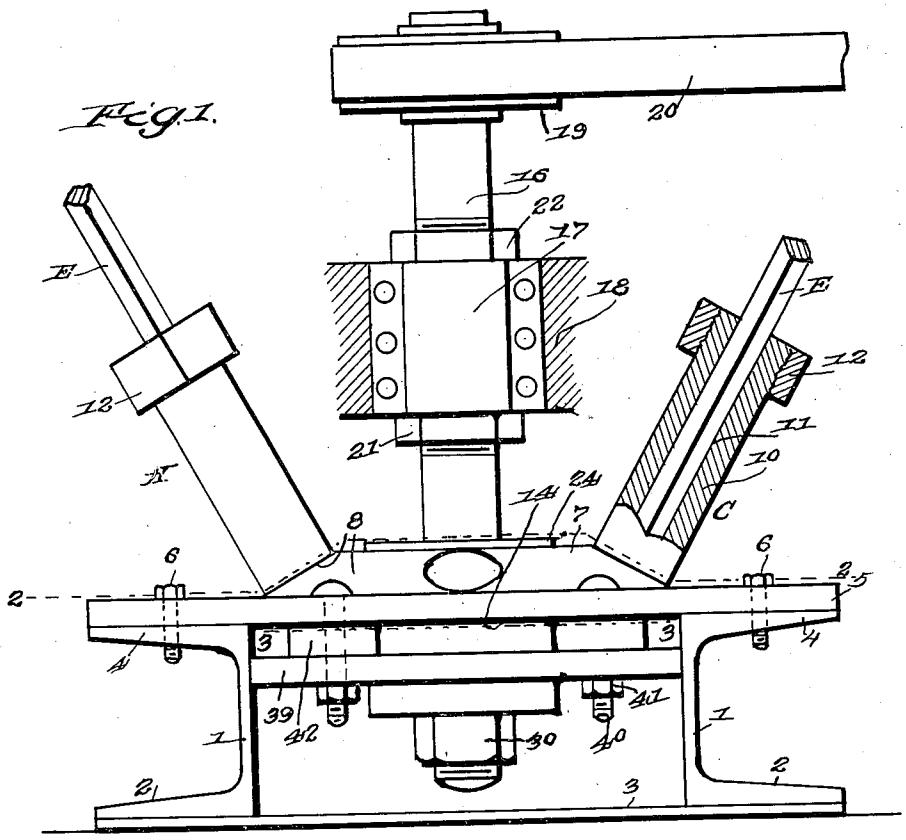


Fig. 4.

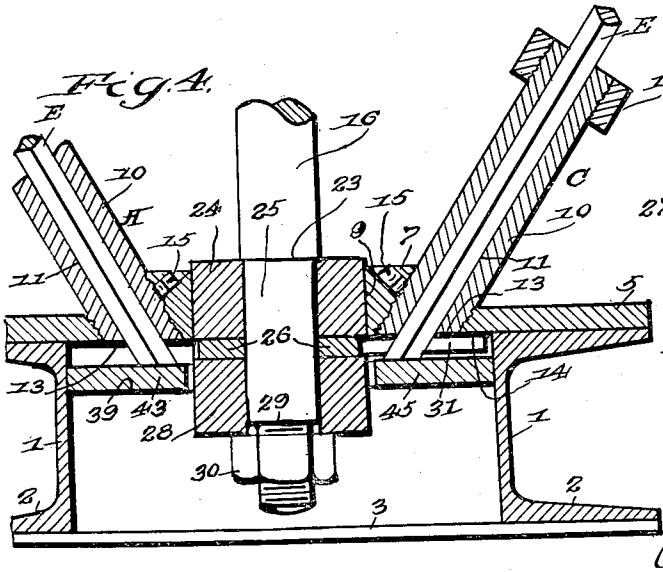


Fig. 5.

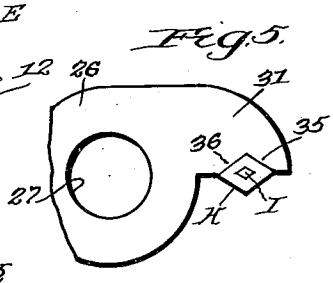


Fig. 8.

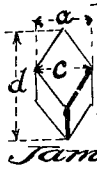
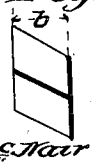


Fig. 9.



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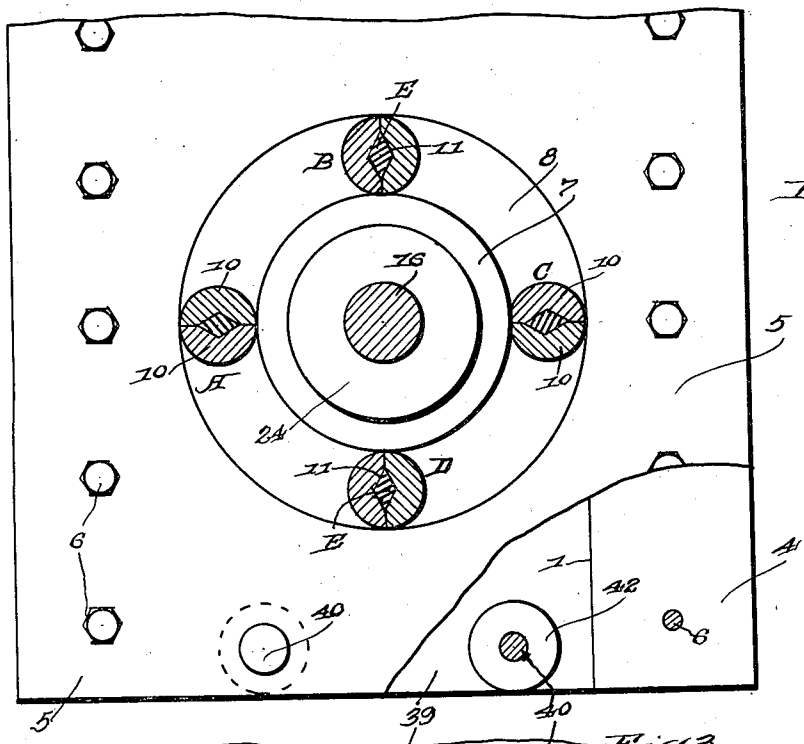


Fig. 2.

Fig 3

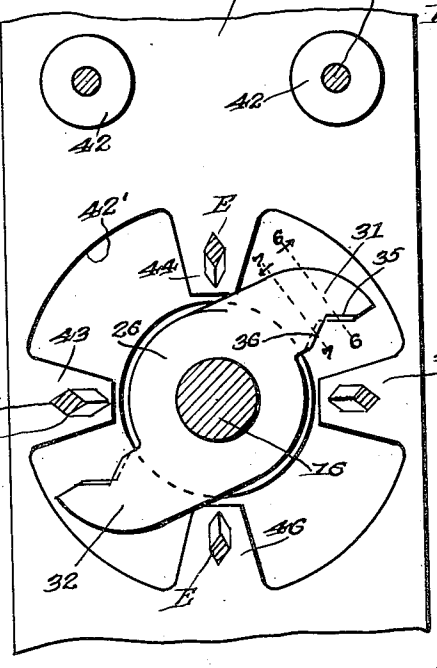


Fig. 10.

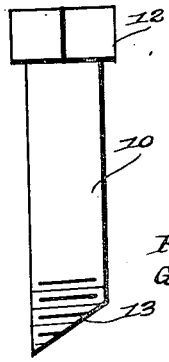


Fig. 6.

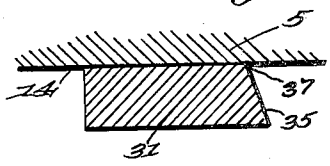
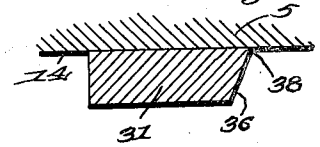


Fig. 7.



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MACHINE AND METHOD FOR MAKING PACKING INTEGERS

James S. McNair, Spokane, Wash.

Application June 24, 1933, Serial No. 677,452
Renewed January 21, 1935

9 Claims. (Cl. 164—40)

This invention relates to an improved method and means for making packing integers, as shown and described in my U. S. Patent No. 1,917,719, issued July 11, 1933.

My above identified prior patent discloses an anti-friction packing formed of metal and wood integers and this invention is addressed primarily to the making of the metal integers. As disclosed in said patent, the metal integers are formed by severing stock bars or rods of the metal into relatively small lengths and these bars or rods are formed of a composition of materials that renders the bars relatively soft and to a considerable extent, somewhat ductile, and hence the severing function involves problems wholly different from those attending severance of hard metallic rods.

In my prior patent, I illustrated and described how the bars could be severed manually but I have now devised a method and means whereby said bars can be severed in a rapid and economical and efficient manner.

It is a feature of this invention to sever the bars or rods in such a manner as not to deform the severed integers and to preserve the cross section thereof and avoid abortive surfaces, or edges.

In the specific form shown, the bars or rods of stock from which the integers are formed or severed are substantially diamond shape in cross section and it is a feature of this invention to sever the integers therefrom at an angle other than a right angle to the longitudinal axis of said bars or rods and more specifically speaking, at an acute or obtuse angle to such longitudinal axis.

Because of the nature of the stock bars to be severed, and because it is a feature of the invention to provide the integers with plane faces devoid of rounded edges, I have provided a novel method and machine in which the severing feature is performed by a shearing action rather than a cutting action.

It is also a feature of the invention to provide a shearing action in combination with means for engaging the integer to be severed, substantially throughout the length of the latter to prevent deformation of the severed integer.

A feature of the invention resides in severing the stock bars or rods on lines parallel to each other, and because of the fact that the rods or bars are severed in planes acute or obtuse to the longitudinal axis of said bars, it follows that no two of the juncturing plane faces of the integers will be at right angles to each other.

The invention has many other novel features and objects which will be more fully described in connection with the accompanying drawings and which will be more particularly pointed out in and by the appended claims.

In the drawings:—

Fig. 1 is a view in elevation illustrative of one form of the invention.

Fig. 2 is a horizontal sectional view on line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view on line 3—3 of Fig. 1.

Fig. 4 is a vertical sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is a fragmentary view of a portion of the severing means showing how it can sever bars of the same cross section but of different sizes.

Fig. 6 is an enlarged sectional view on line 6—6 of Fig. 3.

Fig. 7 is an enlarged view taken on line 7—7 of Fig. 3.

Fig. 8 is an end view of an integer.

Fig. 9 is a view in side elevation thereof.

Fig. 10 is a view in elevation of one of the holders detached from the machine.

Like characters of reference designate similar parts throughout the different figures of the drawings.

As illustrated, the machine includes a supporting frame which may consist of channel beams 1, having their lower flanges 2, secured to a tie plate 3, to form a rigid frame structure. The upper flanges 4 support a bearing plate 5, which may be secured thereto by means such as cap screws 6. Said bearing plate 5, is provided with a centrally disposed bearing hub 7 having a downwardly coned annular section 8 that merges into the upper face of said plate 5, as clearly shown, and the total diameter of said hub 7 is slightly less than the spacing of the channels 1. Said hub 7, is provided with a centrally disposed bore 9, extending therethrough, the purpose of which will presently appear.

Secured in section 8, is one or more stock rod holders which are shown in the form of longitudinally split tubes comprising sections 10. I have shown four of these holders although a machine may be equipped with more or less in accordance with the capacity desired or other requirements to be met, and as all of the holders are identical in form and function only one need be described in detail but for convenience, I will generally designate them as A to D.

Each holder, as stated, is composed of two sections 10, and said sections are longitudinally recessed at 11, so that when said sections 10

are assembled, the resulting tube will be provided with a bore of diamond cross section, as shown, for the type of work this specific machine is intended to perform. The intake or upper ends of the holders are provided with nuts, as shown at 12, which when turned home, serve to unite said sections.

As shown in Fig. 4, the lower end of the holder is inclined at 13 and is exteriorly threaded. When the nut 12 is turned home, and if desired, suitably locked, the resulting assemblage forms a unitary holder structure. The holder is next turned into the exteriorly threaded opening in section 8, as shown in Fig. 4, and the proportions are such that when the holder is in a final position, the inclined lower end 13, will be flush with the lower face 14, of the bearing plate 5. A set screw or like means 15, may serve to lock the holder in its final position. Viewing Fig. 2, it will be seen that the abutting split faces of sections 10, are radially disposed with respect to the central axis of the bore in hub 7. At this point, it is desired to state that while the stock bars, which I will designate at E, are diamond shaped, in cross section, they have a long axis F, which is radially disposed with respect to the center of hub 7, and a circumferential axis G, which is circumferentially disposed with respect thereto. Now the holders are threaded so that when they are turned home, they will guide the stock bars in this relation, and as clearly shown in Fig. 3. It is sometimes desirable to machine the lower face 14, of plate 5, so that the inclined ends 13, will be flush therewith in substantial precision accuracy, for a reason that will presently appear. When all of the holders are in position, as shown in the drawings, the plate 5, is then fully assembled.

Reference will next be made to an improved severing mechanism adapted to coact with the bearing plate and holders just described.

A spindle 16, is journalled in a bearing 17, suitably mounted in fixed relation, as indicated at 18, and means is provided for driving said spindle 16 in a clock-wise direction, viewing Fig. 3, which means may consist of a pulley 19, mounted on said spindle, and a belt 20, trained over said pulley. Slight longitudinal, or in this instance, vertical adjustment, is desirable for spindle 16, and hence, I may thread the same and provide thrust adjustment collars 21 and 22, adapted to engage the ends of bearing 17, whereby the spindle 16 may be adjusted and held in an adjusted position.

A lower portion of spindle 16, is reduced to form a shoulder 23, and a collar 24 is disposed along the reduced portion 25. The hub 26, of a shearing member is bored at 27, to be strung onto said shaft or spindle and a clamping collar 28 serves to hold said hub 26, in place between collars 24 and 28, both of which function as clamping collars. Said spindle 16 is again reduced at 29 and a nut 30, threaded on said spindle, serves to hold the clamping members or collars 24 and 28 in clamping relation with the interposed hub 26 so that the latter will be rotated by said spindle 16. In addition to functioning as a clamping collar, the collar 24, is journalled in bore 9, to steady the lower end of the spindle 16 at a point near the duty action end thereof, as will next be made clear.

As shown, the shearing member is provided with two shearing elements both of which are identical and hence only one thereof need be described, reference being had to Figs. 3, 4, 5, 6 and 7.

Said hub 26, has a wing-like shearing projection or element 31, equal in thickness to said hub and extending therefrom as clearly shown in Fig. 5, the identical remaining shearing element being indicated at 32. Thus the upper faces of the shearing elements are in the same plane, and in practice, they are held by the spindle 16 in close relation against the lower face 14, of plate 5, while said elements are being revolved. While it is not essential that the upper faces of the elements 31 and 32, be flush with the upper face of hub 26, by reason of the fact that the latter does not need to project radially from collars 24 and 28, still for manufacturing convenience, this all-flush relation is more simple. The acting faces or edges, of said shearing wings, are preferably substantially equal in thickness to the length of the integer that is to be severed so that the integer will receive the shearing strain imposed thereon lengthwise thereof. Each shearing wing is provided with a notch shaped to conform to the cross section of the bar to be sheared, and as shown in Fig. 5, wing 31, is recessed on lines 35 and 36, and the angles are constant so that this shearing notch would function either on the bar of largest cross section as indicated at H, or on one of the smallest cross section as indicated at I, and of course on any intermediate cross section between the two extremes. Hence it is not necessary to change the shearing element for different sized rods as far as the actual shearing action is concerned, and if the range of cross section of the rod is not too great.

However, when a change is made for instance from a minimum to a maximum size rod, the shearing element will be changed because a relatively thin shearing element would not back up the large size integer as it would the small sized one. If the change was made from a large size rod to a small sized one, then the shearing element would more than back up the integer.

I have stated that the shearing wings are held in close relation against the face 14, and it may be informative to state that severance is made, in this specific device, by a shearing and not by a cutting action. Hence, while the edges 37 and 38 are truly machined, they need not be sharpened or case hardened by reason of the fact that their coaction with the remaining member to be described, is a shearing instead of a cutting action.

Reference will next be made to the inclined lower end 13, of the bar holder which is substantially the same diameter as the holder, with a slight increase due to the inclination or chamfer. But at any rate, the lower end 13 not only surrounds the projecting end of the rod but extends radially beyond the same in all directions so that this face 13 constitutes the fixed or relatively fixed coacting shearing member that interdependently co-operates with the notched portions of the shearing wings. In other words, the complete shearing action takes place while a wing is traversing the area presented by the lower end 13 of the holder. Hence, the area 14, which the wings engage, is primarily an abutment area.

It will be noted that the holders A to D are inclined to the plane of rotation of the shearing wings at an angle other than a right angle and which as shown, is about sixty degrees, and

which would be an obtuse angle to the plane of rotation of the wings. For this reason, the conforming edges 35 and 36, are inclined to the vertical as shown in Figs. 6 and 7, and the juncture of these two edges is shown correspondingly inclined in Fig. 3. Thus, there is a complete abutment of these active edges with the length of surface presented by the integer which is about to be sheared off. If these edges were vertically disposed, one edge would contact with the bar before the other did, and consequently, the integer would be deformed after it was sheared off, or rather, while being sheared off.

It is a feature of the invention to incline the holders radially from spindle 16, or in other words, so that a plane intersecting the axis of spindle 16, would also intersect the axes of two opposed holders throughout the length of the latter. This disposition very greatly simplifies the manufacture of the shearing wing notches, as will now be clear.

Thus far, I have described a completely operative severing mechanism and method as the bars could be fed by hand to the extent desired in order to obtain integers of the desired length, and this would be true irrespective of whether it was desired to have all the integers of the same or of different length. Several well known roller or other feed devices could be applied to feed all the bars at a given speed and to such an extent as to afford the desired projection thereof, but the present invention is not concerned with any mechanical feed device.

I will next describe a feature of the invention which enables me to automatically obtain the desired extent of projection of the bars from the shearing faces 13, and in the most usual procedure, the extent of projection will be uniform so that all of the integers will be the same length. If shorter or longer lengths are desired, adjustment of this improved feature can be made.

I provide stop means which is preferably in the form of a stop plate 39 and which may be suspended rigidly from the bearing plate 5 by means of bolts 40 extending through said plates. Nuts 41 serve to support the stop plate 39 and spacing washers 42 are interposed between plates 5 and 39 to insure the correct spacing. Adjustment may be readily made by employing spacing washers of different thickness for different projection of the bars. As shown, plate 39 is provided with an integer discharge opening 42 which is disposed concentrically about spindle 16 through which the severed integers may discharge onto any suitable conveyor or chute, not shown. In subjacent relation to each holder, plate 39 is provided with bar stop arms 43 to 46, for the holders A to D, respectively. The top faces of these stop arms are flush with the top face of plate 39, so that when the latter is adjusted into the proper spaced relation to plate 5, the stop arms will be located in the desired position. It will now be seen that the bars in the holders are slidably guided into registry with the subjacent stop arms, and in the path of the shearing wings, so that as the latter revolve, they will sever integers off from said bars. While I have only shown two wings 31 and 32, it is within the province of this invention to provide a sufficient number and in such spaced relation that one will always be shearing and thereby render the load drag on the spindle uniform.

While the operation may be clear from the foregoing, it will be briefly recapitulated.

The bores of the holders are preferably large enough in cross section to receive the largest size stock bar or rod so that they can also receive any intermediate or minimum size and due to the diamond cross section, the shearing thrust will always shift the bar over to the farthest linear apex of the bore. However, if desired, holders with different size bores may be employed so that the bars will fit the bores snugly enough to slide reasonably freely therein. In some cases, the bars will fit so loosely that they will automatically feed themselves by gravity, in other cases, they may be fed by hand or suitable feeding means.

I have shown in Figs. 8 and 9, an end and side view of a large size integer and it will be seen that dimension *a* is about the same as dimension *b*. This will be the usual manner in which the integer will be sheared off, as regards length, although this may be varied as requirements dictate, with reference to my hereinbefore identified patent.

Now assuming the machine to be operating on the size bars shown in the drawings, the stop plate 39 would first be set in the spacing adjustment shown. If necessary, the nut 30 and clamping collar 28 would be removed so that a shearing member could be inserted that would substantially fill the space between stop plate 39 and bearing plate 5, as clearly shown in Fig. 4, so that the shearing wings would engage the integers substantially throughout their length. Then the stock bars would be inserted into the holders, as shown.

The spindle will be started and the shearing wings 30 and 31, in the initial severance, will remove the first or foremost ends of the bars forming integers of irregular shape because usually the ends of the bars will be at right angles to the length thereof. After the first ends have been sheared off, the next severance will be in the angular relation shown. As the wings rotate, integers will be sheared off from each of the bars and the sheared off integers will be advanced by the wings until they pass the stop arms 43 to 46, whereupon they will be free to descend through the opening 42, as will now be clear. Before the bars have been fully sheared into integers, new bars will be fed into the holders so that the operation will be continuous.

Now assuming that the bars shown in Fig. 3, were the largest cross section employed and it was desired to sever bars of an intermediate cross section or of a cross section only slightly less than that shown, then, the stop plate could be adjusted upwardly to take up the clearance shown, if enough was afforded, and no change of shearing member would be necessary. However, if a minimum size bar was to be operated upon, then a thinner shearing member would be necessary because the stop plate would have to be moved into close proximity to the bearing plate in order to shear off integers of a length corresponding to the cross section of the bars operated upon, as will now be clear.

In any event, the notches of the shearing wings will engage and support the integers not only substantially throughout their length, but they will also engage the integers across their greatest cross section, and substantially parallel with the longitudinal axis of the rod.

It will be clear that the rods of diamond cross section have one transverse axis *c*, that may be termed a minor transverse axis, which is less than the axis *d*, which may be termed the major transverse axis, and this would be true if the rod

had many other kinds of polygonal or similar forms of cross section.

While I have shown the holders bored to receive rods of diamond cross section and inclined from the vertical for the reasons stated, it will be clear that the invention would be advantageously useful in severing integers from rods of other forms of cross section, and wherein the angular relation of the shearing mechanism and the rods is different from that herein-shown.

It is believed that the method and apparatus of this invention will be fully understood from the foregoing description, and while I have herein shown and described one specific form of the invention, I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:

1. In a machine for severing stock rods of soft metal into packing integers, a holder slidably guiding a stock rod of a given cross section, and a severing member notched to conform and embrace one peripheral portion of the rod for severing the same to form an integer, and said member engaging the integer substantially throughout the length of the latter while said integer is being severed to prevent deformation of the integer.

2. In a machine for severing stock rods into integers, a longitudinally split tubular holder having a bore shaped to fit the rod and provided with a shearing end, and means coacting with said shearing end for severing a plurality of integers from said rod.

3. In a machine for severing integers from a stock rod, a bearing plate, a longitudinally split tubular holder having a bore shaped to fit the rod to be severed and slidably guiding the latter and said holder being threaded into said bearing plate and having a shearing end, and a shearing element coacting with said shearing end to sever the rod into integers as the rod is advanced in said holder.

4. In a machine for severing integers from a stock rod, a shearing member traversing a given plane, means for guiding a stock rod of polygonal cross section into the path of said member at an angle other than a right angle to the plane of operation of said member, said member having a notch shaped to embrace a portion of the periphery of the rod to be sheared off, and portions of said notch being inclined to the plane of operation of said member at angles other than right angles in accordance with the different angular disposition of the faces of said polygonal rod.

5. In a machine for severing a soft metal rod into integers, a bearing plate having a lower abutment area and provided with a journalling bore, a driving spindle, a shearing member on said spindle, means clamping said member on said spindle and being in journalled relation in said bore, means for longitudinally adjusting said spindle to hold said shearing member against said abutment area, a rod holder secured in said bearing plate for guiding a rod into the path of said shearing member and said holder having a shearing end flush with said abutment area for coaction with said shearing member, and a stop plate in adjustable spaced relation below said bearing plate for arresting projection of said bar and thereby insure severance of integers of uniform length.

6. The herein-described method of shearing a soft metal stock rod of polygonal cross section into integers, comprising, subjecting the rod to shearing strain at an angle other than at right angles to the longitudinal axis of the rod to shear off an integer, and in engaging various angular faces of the integer laterally and longitudinally thereof and substantially parallel with the longitudinal axis of the rod during severance to prevent deformation of the integer.

7. In a machine for severing integers from a soft metal stock rod of a cross section having major and minor transverse axes, comprising, means for holding the rod, and shearing mechanism for severing an integer from the rod at an angle other than a right angle to the longitudinal axis of the rod and engaging the rod lengthwise and laterally thereof parallel to the major axis of the rod, during severance, to prevent deformation of the integer.

8. In a machine for severing integers from a stock rod, means for holding the rod, and shearing mechanism for severing an integer from the rod at an angle other than a right angle to the longitudinal axis of the rod and engaging the rod lengthwise and laterally thereof parallel to the longitudinal axis of the rod, during severance, to prevent deformation of the integer.

9. In a machine for severing integers from a stock rod, means for holding the rod, and shearing mechanism for severing an integer from the rod at an angle other than a right angle to the longitudinal axis of the rod and engaging the integer to be severed therefrom substantially parallel to the longitudinal axis of the rod during severance of the integer.

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