

Sept. 16, 1969

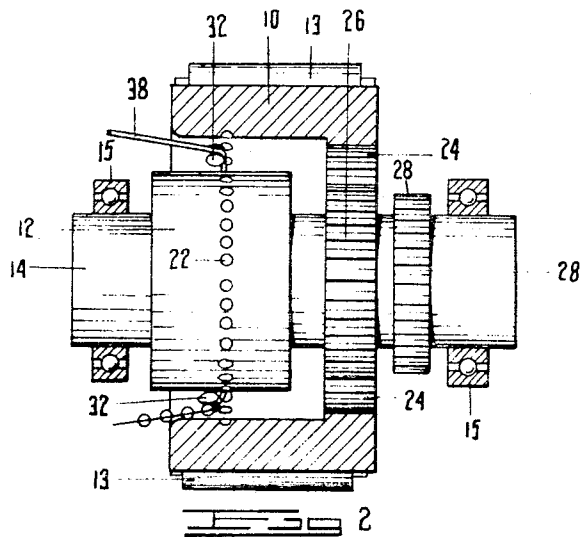
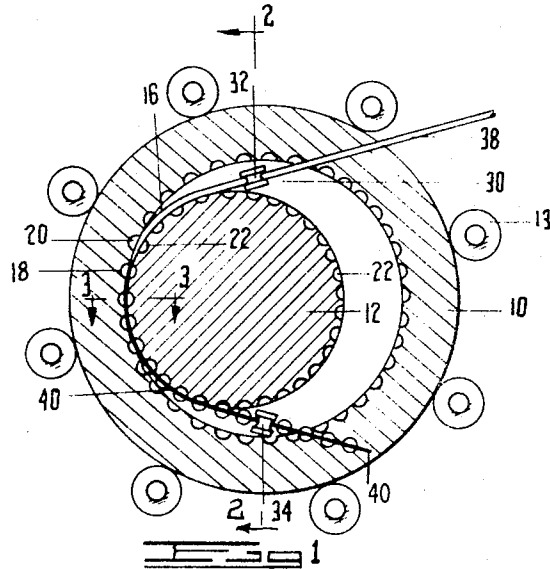
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3,466,911

MASS PRODUCTION OF STANDARDISED COMPONENTS

Filed May 1, 1967

2 Sheets-Sheet 1



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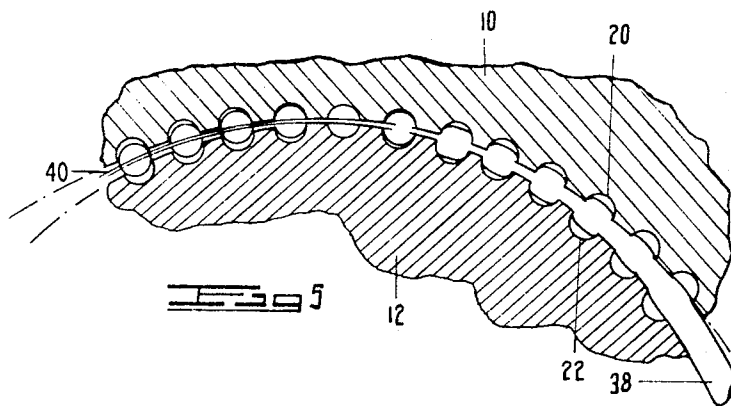
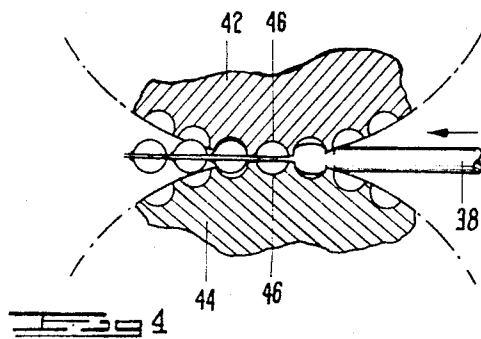
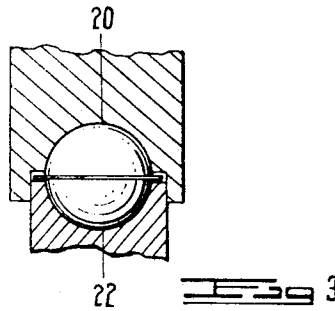
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MASS PRODUCTION OF STANDARDISED COMPONENTS

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2 Sheets-Sheet 2



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MASS PRODUCTION OF STANDARDISED COMPONENTS

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2 Claims

ABSTRACT OF THE DISCLOSURE

A metal band is passed through the throat defined between the inner surface of a hollow roller and the circumference of a roller mounted eccentrically within the cavity of the hollow roller, the opposed roller surfaces defining between them a series of dies which profile the band to form a line of articles separated by rupturable webs. Direction-changing means are provided to lead the band to and from the throat.

This invention relates to the mass production of standardised articles from blank material such as strip, bar, rod or individual pieces. The articles are continuously fabricated as a ribbon in which a multiplicity of the articles is joined by webs which are ruptured to free the individual articles.

In apparatus hitherto proposed, a blank is passed through the throat defined by parallel, juxtaposed rollers which are suitably profiled to act as dies and to impose the required shape on the blank. The objection to this arrangement is that the rollers are virtually in line contact with the blank, with the result that the die cavities defined between the juxtaposed rollers are not completely enclosed during the formation of each article. The material of the blank is therefore not fully entrapped and is extruded from the die cavity to some extent, as the rollers rotate, so that the articles tend to lack precision.

The object of the present invention is to provide apparatus in which the difficulty discussed above is minimised.

According to the invention, the throat is defined between two rollers of which one is hollow and the other is located within its cavity.

The rollers are rotated for their peripheral speeds at the throat to be the same. If one face of the finished article is to be smooth, there need be no co-ordination between the rollers. Indeed, the smooth-peripheral roller may be frictionally driven by the blank. However, if the profile to be imposed on the blank is partly imposed by one and partly by the other roller, then the rollers must be geared together to run in unison, so that the profiles are in register with one another.

The rollers are arranged for their peripheries to be as close together as is possible. This ensures that webs joining or surrounding the shapes formed in the blank are as thin as is practicable. This not only saves material, but facilitates severance of the webs to liberate the individual articles.

It must be pointed out that the machine of the invention has the disadvantage over known machines that a lengthy rod, bar or other blank cannot be led directly into the throat, as the outer roller is in the way, whereas in the known form there is no such difficulty. For short blanks this need not matter, but for long ones, it does. A manner of overcoming this problem is described later.

The machine may be associated with a device for liberating the components from the webs.

A machine in accordance with the invention is illustrated in the accompanying drawings, in which:

FIGURE 1 is a vertical section through the machine, FIGURE 2 is a view, partly in section, on the line 2—2 of FIGURE 1,

FIGURE 3 is a fragmentary sectioned view on the line 3—3 of FIGURE 1, on an enlarged scale,

FIGURE 4 is a fragmentary sectional view of a known machine, and

FIGURE 5 is a fragmentary sectional view of the machine of FIGURES 1 to 3, corresponding to the view of FIGURE 4.

The machine illustrated in FIGURES 1, 2, 3 and 5 consists essentially of an annular roller 10, within the cavity of which is mounted a solid roller 12. The outer roller is rotatably mounted in any suitable manner, for instance on rollers 13, rotating about fixed axes, while the inner roller is carried on a shaft 14 that is journalled in bearings 15.

The inner roller is mounted eccentrically with respect to the outer roller, and the eccentricity is such that a convergent-divergent throat 16 is defined between the inner face of the outer roller and the periphery of the inner roller.

The opposed faces of the two rollers are shaped to act as a series of dies. The cavity of each die 18 is provided partly by one roller and partly by the other; or wholly by one or other of the rollers. In the embodiment illustrated, each roller provides one part of the die. In order that the two parts 20, 22 of each die should be in register on every revolution of the inner roller, the two rollers are geared together. To this end, the shaft 14 has mounted on it a spur wheel 26 that engages with a ring gear 24 fast with the outer roller. The shaft 14 is driven through a spur gear 28. If, however, the die is sunk entirely within one of the rollers, the other roller having a smooth surface, it is then not essential for the rollers to be mechanically coupled, since there is then continuous register of the die.

One roller may be recessed circumferentially to receive the other, so that the die cavity is closed off at each side. This is seen in FIGURE 3.

If the blank to be passed through the throat were of such short length and manoeuvrability that it be introduced into the crescent 30 of the machine and have one end offered to the throat 16, then the machine so far described would be complete. However, if the blank is lengthy, means must be provided to pass it into the crescent and remove it therefrom. In the preferred form, the means consists of direction-changing guides or pulleys 32, 34 (FIGURES 1 and 2) to lead the workpiece into parallelism with the throat and guide it out of the crescent.

The operation of the machine is self-evident. A lengthy blank 38 is passed around the pulley 32 and its end is offered to the throat 16. Rotation of the rollers draws the blank into and through the throat. As the throat converges, so is the blank reduced in thickness and the material flows plastically into each die cavity to fill it. Between the dies, the blank is flattened to a thin ribbon which constitutes an easily rupturable web 40 between the components.

It was observed earlier on that known machines having externally juxtaposed rollers had the inherent disadvantage that the material within the die was incompletely entrapped. An examination of FIGURE 4 will make this evident. There is no position during the passage of the blank through the throat between the rollers 42, 44, when a die 46 forms an enclosed space: the cavity is always open either at the rear, as it approaches the narrowest part of the throat, or at the front as it leaves it, and material within the cavity can extrude through the gap. As seen in FIGURE 5, however, the geometry of the ma-

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chine of the invention produces a throat of considerably longer length and correspondingly more gradual convergence and divergence than in the case of the known machine with externally juxtaposed rollers. This allows the material pressed into each die to be completely entrapped as the die proceeds through the narrowest part of the throat, resulting in the production of components of greater precision and uniformity than is possible with known machines.

A multiplicity of components may be made abreast of each other or of one another, to increase the output of the machine.

When the end product of the machine is a ribbon of components, divided by the rupturable webs 40, means may be incorporated with the machine to separate the components from the ribbon. In other cases the finished articles are formed individually from separate blanks.

I claim:

1. A machine for mass-producing standardized articles from blank material, consisting of two rollers, one of which is hollow and the other of which is contained within its cavity with its axis parallel with the axis of the hollow roller, but displaced from it to provide between the inner face of the hollow roller and the periphery of the inner roller a convergent-divergent throat

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through which the blank passes, a series of die cavities for standardized articles defined jointly by the rollers and disposed in the confronting circumferential surfaces of the rollers, and means to rotate the rollers in the same direction with the die cavities in register.

2. The machine of claim 1 in which the blank material is lengthy, and including direction-changing means to guide the blank into the crescent defined between the rollers and into parallelism with the throat, and to guide it from the throat to the outside of the crescent.

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