

[54] **ROTARY STAMPING APPARATUS**

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1970, abandoned.

[30] **Foreign Application Priority Data**

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83/663

[51] Int. Cl..... **B26d 1/28**

[58] Field of Search **83/331, 339, 343, 344, 346,**
83/347, 663

[56]

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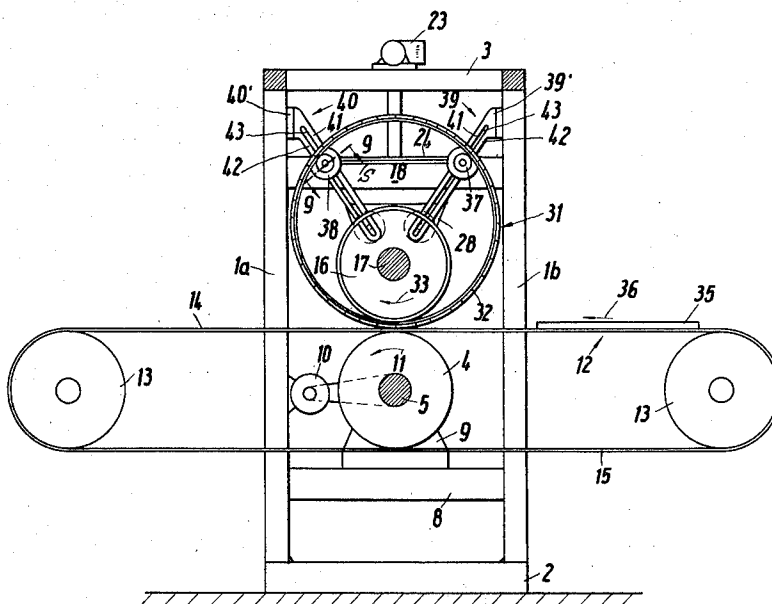
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[57]

ABSTRACT

This rotary stamping apparatus includes a presser roller supported inside a hollow cylinder roller which carries tool means on its outer surface. The presser roller presses the hollow cylinder toward a counter roller whereby the hollow cylinder is positively held and a working area is formed through which sheet material is fed from which shapes are punched by said tool means when the rollers are rotated. The hollow cylinder roller is also held in position by automatically adjustable guide rollers.

20 Claims, 10 Drawing Figures



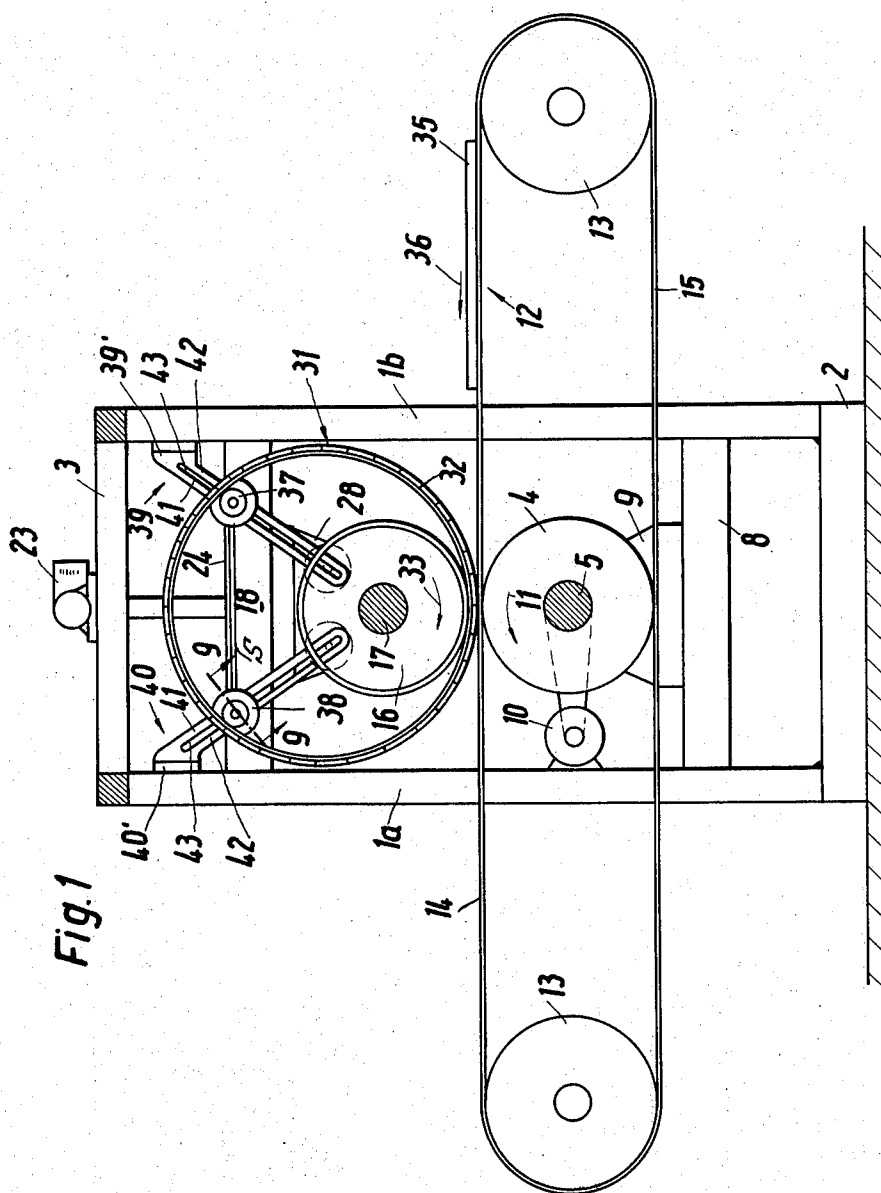
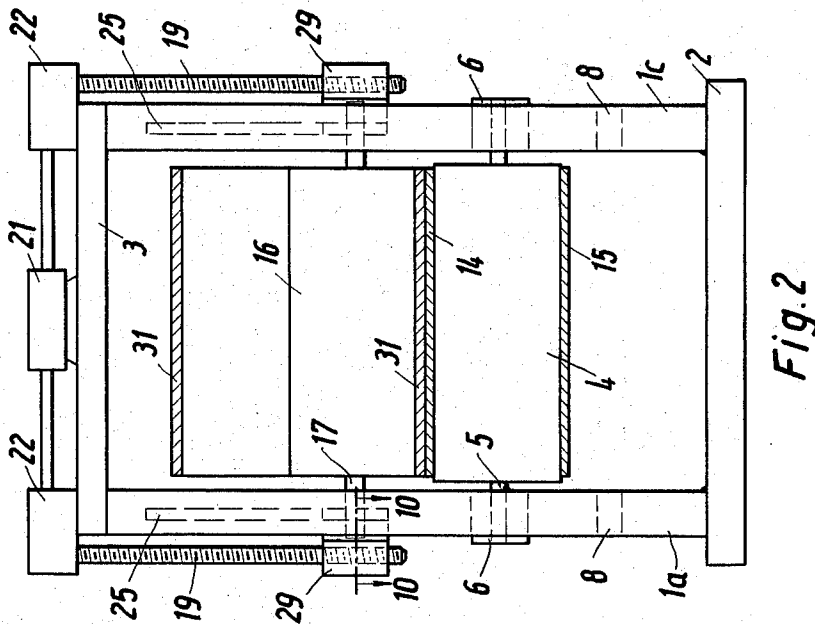
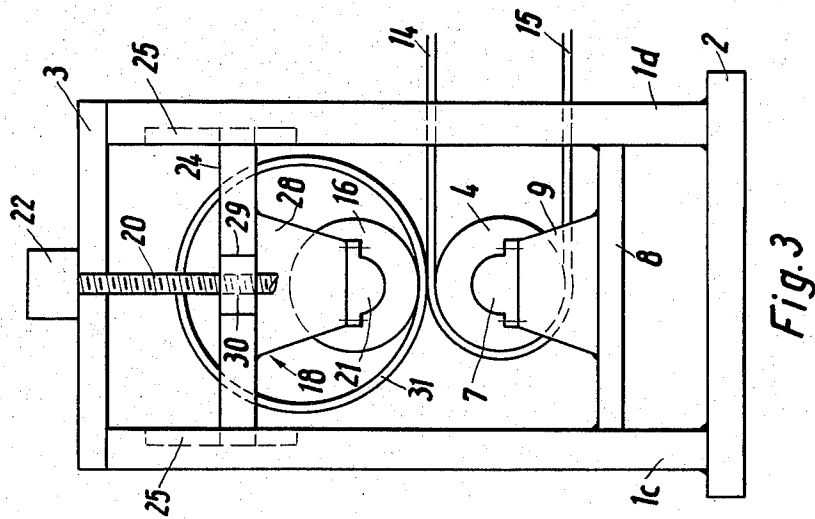


Fig. 1

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Fig. 4

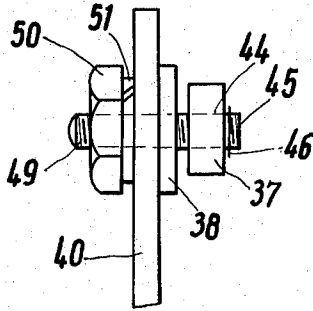


Fig. 5

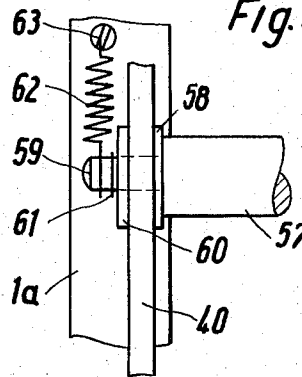


Fig. 6

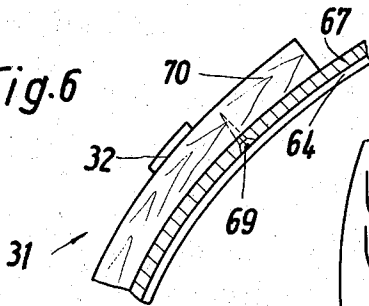


Fig. 8

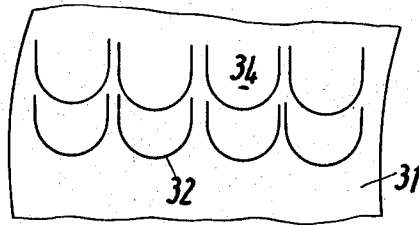


Fig. 7

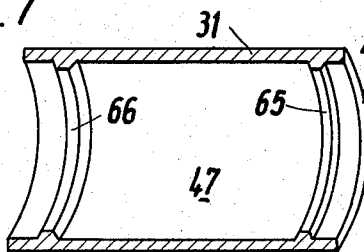


Fig. 9

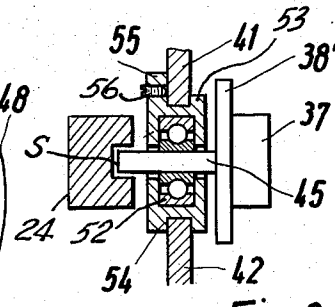
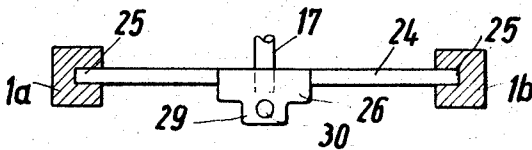


Fig. 10



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ROTARY STAMPING APPARATUS

This application is a continuation-in-part application of my allowed copending application Ser. No. 32,325 filed Apr. 27, 1970, now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates to a rotary stamping apparatus for cutting or punching shapes out of sheet material, more specifically, the invention relates to rotary stamping apparatus in which two rollers are pressed toward or against each other, and in which one of the rollers carries on its outer surface the rotary tools, such as stamping blades or knives.

Depending on the size of the different shapes to be punched or cut on the same apparatus, it would be desirable to use stamping rollers, each of which has another size, especially a different circumference. However, producing such rollers is expensive and it is difficult to mount them in a stamping apparatus.

OBJECTS OF THE INVENTION

In view of the above the invention aims at providing tool carrying stamping rollers which may be manufactured at less expense than heretofore, which may be manufactured in any suitable size and which may be easily replaced and/or mounted in a stamping apparatus whereby a positive guidance of the tool carrying cylinder is to be accomplished regardless of the size of the cylinder, and whereby guide rollers for the tool carrying cylinder are to be automatically adjusted in unison so that several rollers are adjusted simultaneously.

SUMMARY OF THE INVENTION

According to the invention there is provided a rotary stamping apparatus in which the material to be stamped is fed through between two rollers which are pressed toward each other, one of said rollers having tool means attached to its circumferential surface, and wherein the roller which carries said tools is a hollow cylinder which has a given inner diameter and which is supported to surround a presser roller having an outer diameter smaller than said given inner diameter, whereby the hollow cylinder is positively held between said presser roller and a counter roller. In a preferred embodiment the hollow cylinder is driven directly by the frictional contact between the hollow cylinder and the presser roller and/or the counter roller. Guide rollers are movable with their axes in preferably radial slots and are adjustable in unison and automatically when the ends of their axis ride in a slot in an adjustable horizontal crossbar.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the invention may be clearly understood, it will now be described, by way of example, with reference to the accompanying drawings, wherein:

FIG. 1 shows a side view, partially in section of a rotary stamping apparatus embodying the invention;

FIG. 2 is a front view of an apparatus of similar construction as that of FIG. 1 but omitting certain guide rollers;

FIG. 3 is a side view similar to that of FIG. 1 illustrating somewhat modified roller support means;

FIG. 4 is a partial side view of a guide roller and its support and adjusting means;

FIG. 5 is a partial side view of another guide roller embodiment with resilient means for forcing or pressing the guide roller against the hollow cylinder;

FIG. 6 is a partial sectional view through the hollow cylinder which carries the tool means;

FIG. 7 is a longitudinal sectional view of one embodiment of the hollow cylinder roller;

FIG. 8 is a partial surface view of the hollow cylinder with cutting or stamping blades for cutting, for example, shoe uppers from sheet material;

FIG. 9 is a sectional view along line 9—9 in FIG. 1 showing a modified roller embodiment; and

FIG. 10 is a sectional view along line 10—10 in FIG. 2 illustrating the presser roller support means.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

The frame structure of FIGS. 1, 2 and 3 comprises upright posts 1a, 1b, 1c and 1d secured to a base member 2, as by welding, and joined at the top by upper crossbars 3. A counter roller 4 is supported with its shaft 5 in journal boxes 6 as shown in FIG. 2 or in bearing boxes 7 as shown in FIG. 3. The journal boxes 6 or the bearing boxes 7 are removably attached, as by threaded bolts not shown, to a lower crossbar 8, if necessary through a pedestal 9.

The counter roller 4 is driven, for example, by a motor and chain drive 10 attached to the frame structure in any known manner. As shown by arrow 11 counter roller 4 rotates, for instance, in the counterclockwise direction.

A feed-in means in the form of an endless conveyor belt 12 is supported on belt support members such as drums 13 which maintain the belt in such a position that its upper run 14 moves above roller 4 while its lower run 15 moves below roller 4.

A presser roller 16 is supported with its shaft 17 in a support structure 18 which is adjustable up and down, for example, by threaded rods or shafts 19 or 20 which are driven by a motor 21 through gear boxes 22 as shown in FIGS. 2 and 3, or by a separate drive unit 23 as shown in FIG. 1.

The support structure 18 comprises a crossbar 24 (see FIG. 10) the ends of which are guided in tracks such as grooves 25 which face each other in the upright posts 1a and 1b as well as in 1c and 1d. The crossbar 24 carries a removable journal or bearing box 26 in which the shaft 17 is either directly supported as shown in FIG. 2, or the journal or bearing box 27 may be attached to the crossbar 24 through a pedestal 28 as shown in FIGS. 1 and 3. This modification permits making the threaded shaft 20 substantially shorter than the respective shafts 19 in the embodiment of FIG. 2.

The crossbar 24 or the bearing box 26 is provided with a lug 29 (FIG. 10) which has a threaded hole 30 therethrough. The threaded rods or shaft 19, 20 extend through their respective holes 30 whereby, upon rotation of these shafts 19, 20, the crossbar 24 may be adjusted up and down in the grooves 25.

The crossbar 24 will be adjusted to its uppermost position for inserting a hollow cylinder roller 31 into the rotary press. Tool means 32 are attached to the outer surface of cylinder 31 as will be described more fully below with reference to FIGS. 6 and 9. The cylinder 31 is positively held in its desired position by said presser roller 16 which has a smaller outer diameter than the inner diameter of said hollow cylinder and which is in-

serted in said hollow cylinder to press the latter either directly or indirectly through said belt 12 against the counter roller 4 when the crossbar 24 is lowered to its proper pressure maintaining position. The insertion or removal is accomplished by unscrewing the bearing box 27 from the pedestal 28 or the latter from the crossbar 24.

The presser roller 16 may also be actively driven by means as shown at 10, whereby the rotation will be in the clockwise direction as indicated by the arrow 33. Stated differently, rollers 4 and 16 will rotate in opposite directions.

Due to the frictional or force transmitting contact between the pressure roller 16 and the cylinder 31 on the one hand and due to the frictional or force transmitting contact either directly or through belt 12 between the cylinder 31 and the counter roller 4, the cylinder 31 is not only held in proper position but it is also positively driven by said rollers for stamping or cutting shapes 34, such as shoe uppers, out of sheet material 35 advancing in the direction of the arrow 36 on the belt 12 toward and through between the cylinder 31 and the counter roller 4.

However, it may be desirable to provide guide means for said cylinder 31 either in the form of one or two guide rollers 37, 38 for preventing cylinder vibrations and for proper lateral as well as vertical alignment of the tool carrying cylinder 31. The guide rollers 37, 38 are supported by respective bars 39, 40 attached to the frame structure. Each bar has two arms 41, 42 and a longitudinal aperture 43 therein.

The guide rollers 37, 38 are shown in more detail in FIGS. 4, 5 and 9. FIG. 4 shows a guide roller 37 of smaller diameter than guide roller 38. Both guide rollers are supported, preferably rotatably as by journal or bearing means 44 on a shaft 45. The roller of smaller diameter will rest against the inner surface 47 of the hollow cylinder 31, whereas the larger diameter roller will rest against an end face or edge 48 of cylinder 31, please see FIG. 7. A snap ring 46 holds the rollers on the shaft 45 which has, for example, a threaded end 49 which extends through said longitudinal aperture 43 of the support bars 39, 40. By tightening a nut 50 on the threaded end 49, the guide roller means will be held in the desired position providing a desired spacing between shaft 45 and presser roller shaft 17. A lock-washer 51 is, for example, inserted between the nut 45 and the bar 40.

By loosening the nut 50 the position of the shaft 45 and thus of the guide rollers may be adjusted along the entire length of the longitudinal aperture 43.

A simultaneous automatic parallel adjustment of the guide rollers in unison with each other is accomplished when the shaft ends 45, or 49, or 59 of both, the right and left guide rollers ride in a longitudinal guide slot S in the crossbar 24. Thus, after loosening the nuts 50 or the set screws 56, the roller position will be automatically adjusted with the raising or lowering of the crossbar 24 whereby both rollers are adjusted to the precise same position.

Preferably the bars 39, 40 extend at an angle relative to the horizontal through shaft 17 and through a plane extending perpendicularly to shaft 17 so that these bars point toward the shaft 17 as shown in FIG. 1. However, the invention is not limited to the example shown. The bars 39, 40 could extend horizontally and/or the foot members 39', 40' could, instead of being rigidly at-

tached to the frame structure, be slidable up and down along the respective upright post to which the foot members 39', 40' would be releasably attached.

The roller 38 could be in the form of a flange 38' forming part of roller 37 as shown in FIG. 9. Here the shaft 45 is supported, for example, in a ball bearing 52 held in a housing 53 with guide grooves 54 therein. The guide grooves 54 engage the arms 41, 42 of the bars 39, 40 so that the housing 53 glides along these arms when a setscrew 56 in an extension 55 of the bearing housing 53 is loosened. The bearing housing is then fixed in any desired position along the bar 40, by tightening the setscrew 56 or several thereof for engagement with both arms 41, 42. In the embodiment of FIG. 9 the bars 39, 40 would be open ended for insertion of the bearing housing 53 into the aperture 43. If desired, a latch could be provided for closing such open ends of the bars.

Referring to FIG. 5, the guide roller in this embodiment is in the form of a rod 57 which extends through the entire hollow cylinder 31 and the right hand end of which is supported in the same manner as the left hand end shown in FIG. 5. The rod 57 is provided with a flange 58 resting against bar 40. A shaft end 59 extends through the longitudinal aperture 43 in the bar 40. Axial movement is prevented by a washer 60 and a snap ring 61.

Resilient means such as a spring 62 is connected at one end to the upright frame post 1a as by a screw 63 and at the other end thereof to said shaft end 59 whereby the rod 57 is pressed or pulled against the cylinder 31 depending on the position of the rod and the cylinder relative to each other. The rod 57 is rotatable about its shaft ends 59.

Referring to FIGS. 6 and 7, the cylinder 31 is provided on its inner surface 47 adjacent its end faces or edges 48 with track means 64 which may have different profiles as shown at 65, 66 in FIG. 7 or which may be respective grooves adapted for cooperation with said guide rollers.

Referring to FIG. 6, the cylinder 31 comprises an inner shell 67 of rigid tool supporting construction which may be made of one or of several pieces of sheet metal, for example 3mm thick. Attached to the outer surface as by means of screws 69 are die members 70 which carry the tool means 32. Such tool means in the form of cutting edges or blades are, for example, inserted in slots of wooden blocks forming said die member 70.

Although only a few tools 32 are shown in FIG. 8, it is to be understood, that substantially the entire surface of the cylinder 31 will be filled with tools as much as possible so as to minimize any waste and to obtain an optimum number of shapes 34.

Although specific embodiments of the invention have been described, it is to be understood, that it is intended to cover all modifications and equivalents within the scope of the appended claims.

What is claimed is:

1. In a rotary stamping apparatus for cutting shapes out of sheet material by means of rotary tools attached to the circumferential surface of one of two rollers which are supported in a frame and pressed toward each other, the improvement comprising a tool carrying roller in the form of a hollow cylinder having a given inner diameter, a presser roller having a longitudinal axis and a smaller outer diameter than said given

diameter, means for supporting the presser roller in said frame so that the presser roller extends through said hollow cylinder, means for pressing said presser roller against the inner surface of said hollow cylinder and thereby the outer surface of the hollow cylinder directly or indirectly against the other roller of said two rollers whereby the other roller acts as a counter roller to positively hold the hollow cylinder in position, means operatively associated with at least one of said rollers for rotating the rollers, guide roller means, support means attached to said frame for supporting said guide roller means in a position for guiding said hollow cylinder, said guide roller support means including resilient means and means for holding said resilient means between a fixed point and said guide roller means for forcing the guide roller means against said hollow cylinder.

2. The rotary stamping apparatus according to claim 1, wherein said guide rollers support means further include supporting bars for said guide rollers releasably attached to said frame so that said supporting bars are located in a plane extending perpendicularly relative to said longitudinal axis of the presser roller, said supporting bars forming an angle relative to a horizontal plane which extends through said longitudinal presser roller axis so that said bars point substantially radially inward relative to said guide rollers, said resilient means adjusting the position of said guide rollers along said supporting bars.

3. The rotary stamping apparatus according to claim 2, wherein said guide roller supporting bars have longitudinal apertures therein along the length of which said guide rollers are adjustable by said resilient means.

4. The rotary stamping apparatus according to claim 1, wherein said guide roller support means include bearings for said guide rollers.

5. The rotary stamping apparatus according to claim 1, wherein said hollow cylinder comprises track means arranged adjacent its end faces for cooperation with said guide rollers.

6. The rotary stamping apparatus according to claim 5, wherein said track means are provided on the inside of said hollow cylinder roller.

7. The rotary stamping apparatus according to claim 1, wherein each of said guide roller means includes a pair of guide rollers including a first guide roller and a second guide roller, said first guide roller having a smaller diameter than said second guide roller and wherein said first guide roller rests against the inner surface of the hollow cylinder, whereas the second guide roller rests laterally against an end face of the hollow cylinder.

8. The rotary stamping apparatus according to claim 7, wherein said smaller diameter guide roller is a shaft extending through the entire length of the hollow cylinder.

9. The rotary stamping apparatus according to claim 8, wherein said larger diameter guide roller is formed as a flange at each end of said guide roller shaft and in contact with each end face of said hollow cylinder.

10. The rotary stamping apparatus according to claim 1, wherein said means for supporting the presser roller comprise a horizontal crossbar with a longitudinal guide slot therein, said guide roller means having shaft ends riding in the guide slot for automatically adjusting the position of said guide roller means along said support means.

11. In a rotary stamping apparatus for cutting shapes out of sheet material by means of rotary tools including a hollow cylinder roller having cutting blades attached to its circumferential outer surface, a counter roller, a presser roller having a longitudinal axis and extending axially through said hollow cylinder roller for holding the latter in position in a frame structure, and means for driving any one of said rollers, the improvement comprising adjustable positioning means attached to said frame structure and to each end of said presser roller for adjusting the position of the presser roller relative to the inner surface of said hollow cylinder roller to press the hollow cylinder roller directly or indirectly against the counter roller, guide roller means for said hollow cylinder roller, guide roller supporting bars for said guide rollers, means for attaching said guide roller supporting bars to said frame structure so that said supporting bars are located in a plane extending perpendicularly relative to said longitudinal axis of the presser roller, said supporting bars forming an angle relative to a horizontal plane which extends through said longitudinal presser roller axis so that said bars point substantially radially inward relative to said rollers, and means for adjusting the position of said guide rollers along said supporting bars substantially radially relative to said rollers.

12. The rotary stamping apparatus according to claim 11, wherein said adjusting means comprise resilient means and means for holding said resilient means between a fixed point and said guide roller means for continuously forcing the guide roller means against said hollow cylinder roller.

13. The rotary stamping apparatus according to claim 12, wherein said guide roller supporting bars have longitudinal apertures therein along the length of which said guide rollers are adjustable by said resilient means.

14. The rotary stamping apparatus according to claim 11, further comprising bearing means for supporting said guide rollers on said supporting bars.

15. The rotary stamping apparatus according to claim 11, wherein said hollow cylinder roller comprises track means arranged adjacent its end faces for cooperation with said guide rollers.

16. The rotary stamping apparatus according to claim 15, wherein said track means are provided on the inside of said hollow cylinder roller.

17. The rotary stamping apparatus according to claim 11, wherein each of said guide roller means includes a pair of guide rollers having a first guide roller and a second guide roller, said first guide roller having a smaller diameter than said second guide roller, and wherein said first guide roller rests against the inner surface of the hollow cylinder, whereas the second guide roller rests laterally against an end face of the hollow cylinder.

18. The rotary stamping apparatus according to claim 17, wherein said smaller diameter guide roller is a shaft extending through the entire length of the hollow cylinder.

19. The rotary stamping apparatus according to claim 18, wherein said larger diameter guide roller is formed as a flange at each end of said guide roller shaft and in contact with each end face of said hollow cylinder roller.

20. The rotary stamping apparatus according to claim 11, wherein said means for supporting the presser

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roller comprise a horizontal crossbar, said means for adjusting the position of said guide rollers including a longitudinal guide slot in said crossbar, said guide roller means having shaft ends riding in the guide slot

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whereby the guide rollers are adjusted in their position automatically with the raising and lowering of the crossbar.

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