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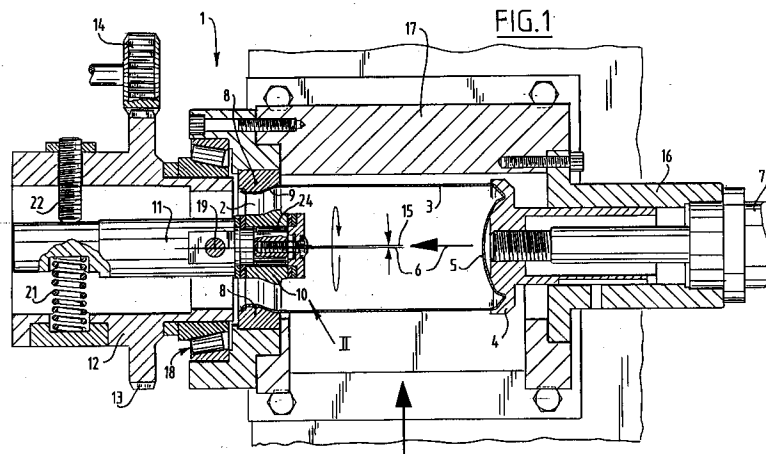
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NL-2517 GK The Hague(NL)(54) **Device for forming a constriction on the open end zone of a metal can.**

(57) A device for forming a constriction on the open end zone of a metal can with a cylindrical body, comprising:

- (1) a support member for supporting the bottom of a can and for pushing displacement thereof in axial direction;
- (2) an annular anvil placed coaxially of this support member, on the side of which facing the support member an internal modelling surface is present which in the direction away from the support member has a form adapted to the de-

sired shape of the constriction; and
(3) a freely-rotating roller having a form adapted to the shape of the modelling surface, which roller can press the end zone of a positioned can forcefully against the modelling surface, which roller is carried by a support member which is driven by drive means in a circular path concentric to the annular modelling surface, wherein the axis of rotation of the freely-rotating roller extends at least approximately in the said axial direction.

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The invention relates to an operation having the object of providing the open mouth zone of a metal can with a constricted end portion.

For this purpose the invention provides a device for forming a constriction on the open end zone of a metal can with a cylindrical body, comprising:

- (1) a support member for supporting the bottom of a can and pushing displacement thereof in axial direction;
- (2) an annular anvil placed coaxially of this support member, on the side of which facing the support member an internal modelling surface is present which in the direction away from the support member has a form adapted to the desired shape of the constriction; and
- (3) a freely-rotating roller having a form adapted to the shape of the modelling surface, which roller can press the end zone of a positioned can forcefully against the modelling surface, which roller is carried by a support member which is driven by drive means in a circular path concentric to the annular modelling surface, wherein the axis of rotation of the freely-rotating roller extends at least approximately in the said axial direction.

During use of the device a rolling operation takes place wherein the can for processing is positioned relative to the annular anvil such that the end rim of the can comes to lie against the anvil. The end rim of the can is subsequently pressed forcibly against the anvil by a fully peripheral rolling operation by means of the freely-rotating roller. The shapes of the anvil and the freely-rotating roller are mutually adapted and correspond with the shape of the constriction to be obtained.

A gradual shifting of the can in axial direction takes place during the operation.

The operation is terminated at the moment when the constriction has reached the desired length. The shape is determined by the form of the anvil and the freely-rotating roller.

The freely-rotating roller can have a rotational centre line with the same direction as that of the can. The device can however advantageously have the feature that the rotational axis of the freely-rotating roller lies in a tangential plane and forms a small angle with the axial direction. A very effective ironing is achieved herewith and the material "seeks" a path between the ring and the roller. Thus achieved is that minimal axial forces are exerted on the can wall.

A particular embodiment has the feature that the angle has a value in the order of magnitude of 0.5° .

In a practical embodiment the bearing construction for the freely-rotating roller revolves with respect to the fixedly disposed can. This permits a

very simple construction. It will be apparent that the complementary arrangement is also possible. What is important here is the relative movement of the roller relative to the can.

The roller and the anvil must be very hard. For an acceptable stand-time use can for instance be made of hard-metal or another material with a very high wear resistance and hardness.

A certain flexibility in the construction can be useful in order to properly position the co-acting surfaces relative to one another under all conditions. Excessive rigidity in the construction can result in extremely great forces which could have an adverse effect on the useful life of the device.

The annexed drawing shows a device according to the invention. In the drawing:

figure 1 shows a cross sectional view of a device according to the invention;

figure 2 shows on enlarged scale the detail II in figure 1;

figure 3 shows a cross section through the anvil and the freely-rotating roller in the situation where a modelling operation is about to take place;

figure 4 shows a detail of an end wall of a can after processing by the device according to the invention; and

figure 5 is a perspective view of a can provided with a constriction by the device according to figure 1.

Figures 1 and 2 show a device 1 for forming a constriction 2 on the open end zone of a metal can 3 with a cylindrical body, which device comprises:

a support member 4 for supporting the bottom 5 of the can 3 and for pushing displacement thereof in axial direction 6 by means of a pushing member 7 which is controlled in suitable manner by a control unit (not shown);

an annular anvil 8 placed coaxially of this support member 4, on the inner side of which facing the support member 4 an internal modelling surface 9 is present which in the direction away from the support member 4 has a form adapted to the desired shape of the constriction 2; and

a freely-rotating roller 10 likewise having a form adapted to that of the desired constriction 2 and therefore to the shape of the modelling surface 9, which roller 10 can press the end zone of the positioned can 3 forcefully against the modelling surface 9, which roller 10 is carried by a support member 11 which forms part of a rotor 12 with an externally placed pinion 13 that co-acts with a drive gear wheel 14 which is connected to a drive motor (not drawn) such that the rotor 12 can thereby be set into a rotating movement, wherein the freely-rotating roller 10 is driven in a circular path concentric to the annular modelling surface 9, wherein the axis of rotation 15 extends at least approxi-

mately in the said axial direction 6.

The support member 4 is guided slidably in axial direction in a cylinder block 16 which forms part of a frame 17 in which the anvil ring is clamped and to which the rotor 12 is rotatably connected by means of a bearing unit 18.

The support member 11 is pivotally connected via a pivot shaft 19 to the rotor 12. The views according to figures 1 and 2 should be understood such that in the situation shown therein the freely-rotating roller 10 engages forcibly in a direction containing at least a considerable radial component. The rotational sense of rotor 12 is indicated by 20.

The axis of rotation 15 of the freely-rotating roller 10 lies substantially in a tangential plane and forms an angle of roughly 0.5° with the said axial direction 6. Figures 1 and 2 show this angle in a somewhat exaggerated manner for the sake of clarity. In order to obtain a correct angle the rotor 12 is supported on the one side by a pressure spring 21 and is placed in a sloping position counter to the action of the pressure spring by means of an adjusting screw 22 protruding outside the rotor 12. The freely-rotating roller 10 is supported rotatably by the support member 11 by means of a roller bearing 24.

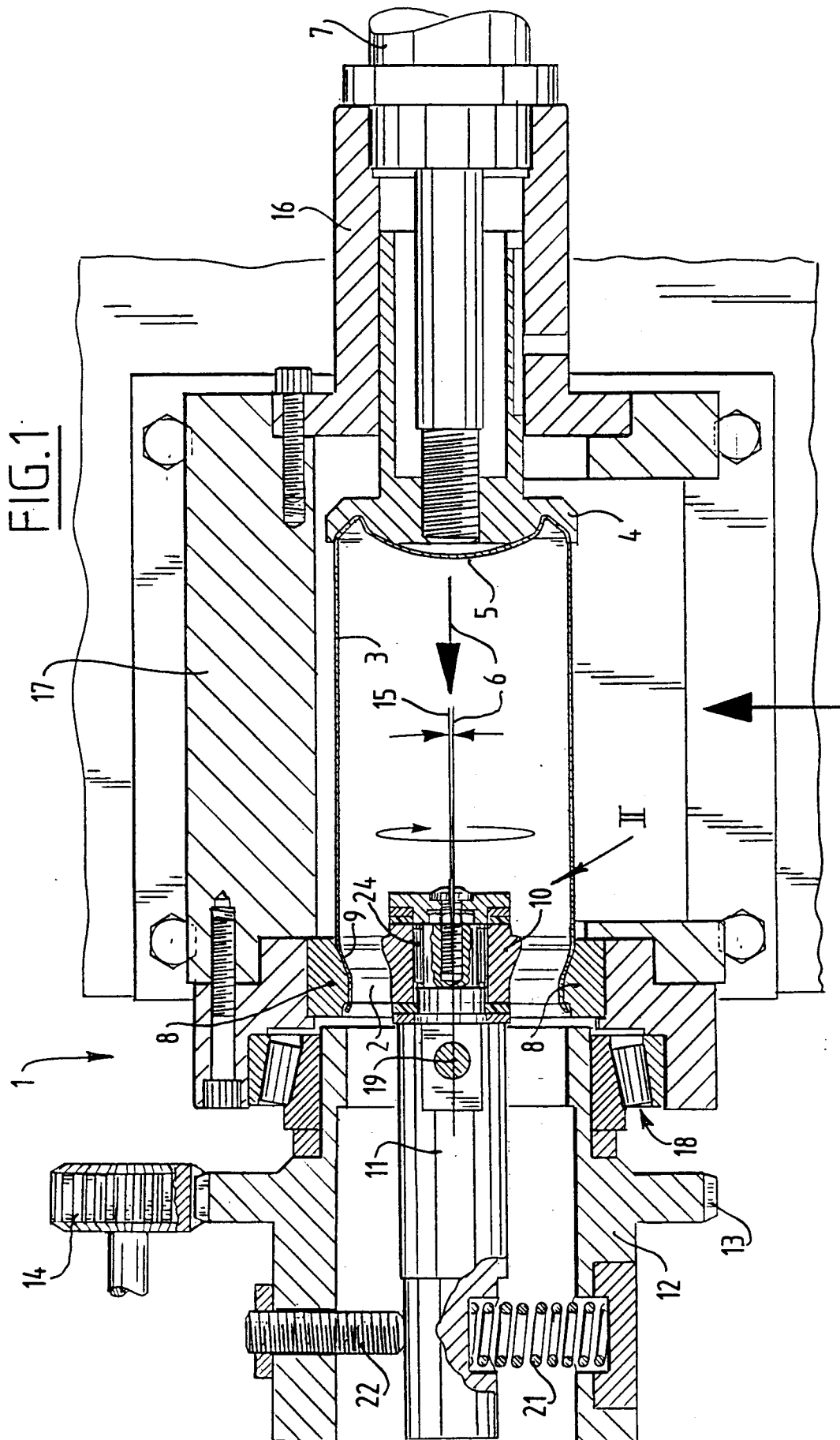
Figure 3 shows the co-acting shapes of the modelling surface 9 of the anvil 8 and the roller 10. In the situation shown in figure 3 a can 3 is introduced into the transition zone between the anvil 8 and roller 10. Due to the rolling movement of roller 10 over the annular inner surface of the anvil 8 the can is pulled inward with its open end zone 23, whereby the constriction 2 is formed, as is shown in figure 4.

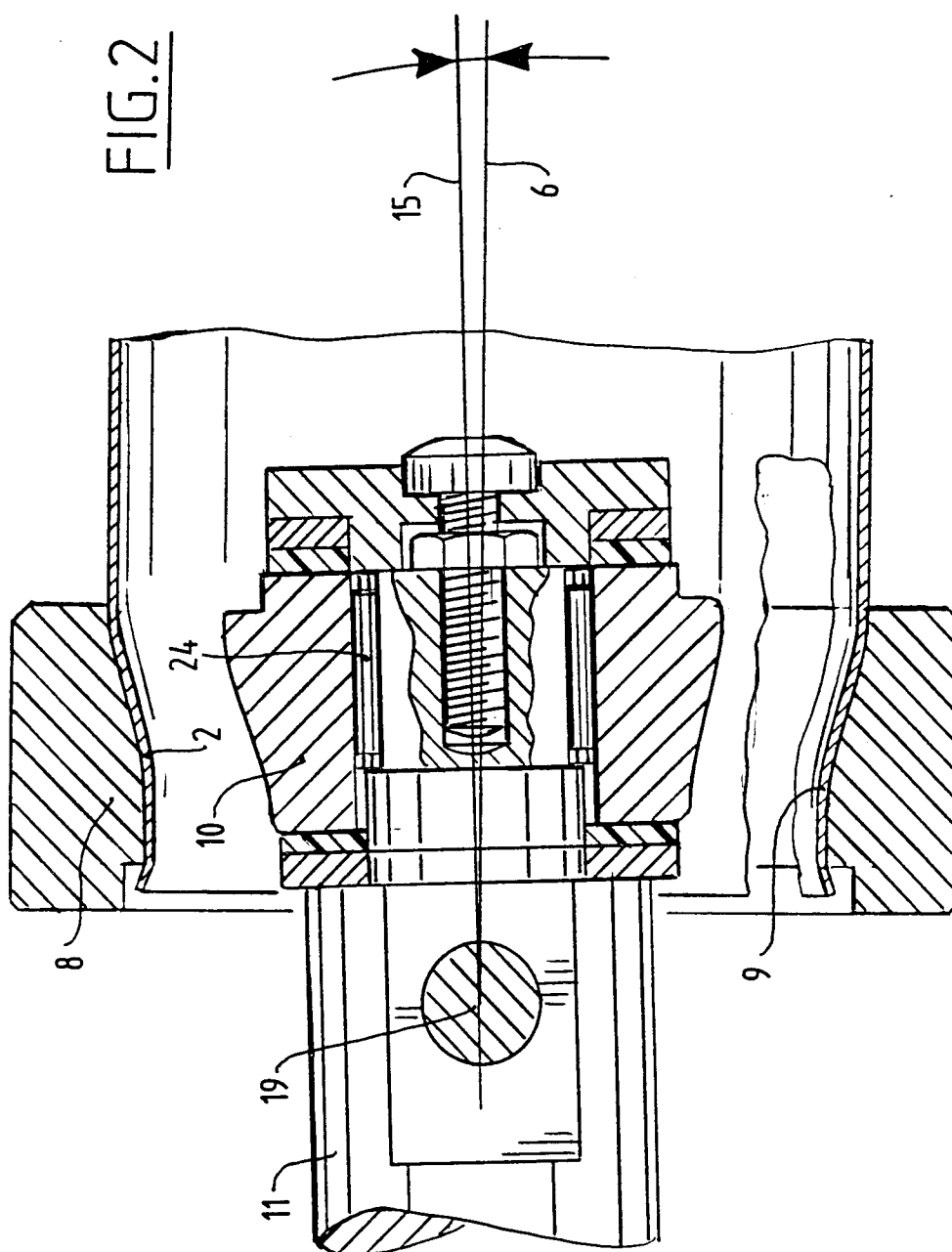
Claims

1. Device for forming a constriction on the open end zone of a metal can with a cylindrical body, comprising:
 - (1) a support member for supporting the bottom of a can and for pushing displacement thereof in axial direction;
 - (2) an annular anvil placed coaxially of this support member, on the side of which facing the support member an internal modelling surface is present which in the direction away from the support member has a form adapted to the desired shape of the constriction; and
 - (3) a freely-rotating roller having a form adapted to the shape of the modelling surface, which roller can press the end zone of a positioned can forcefully against the modelling surface, which roller is carried by a support member which is driven by drive

means in a circular path concentric to the annular modelling surface, wherein the axis of rotation of the freely-rotating roller extends at least approximately in the said axial direction.

2. Device as claimed in claim 1, **characterized in that** the rotational axis of the freely-rotating roller lies in a tangential plane and forms a small angle with the axial direction.
3. Device as claimed in claim 2, **characterized in that** the angle has a value in the order of magnitude of 0.5° .





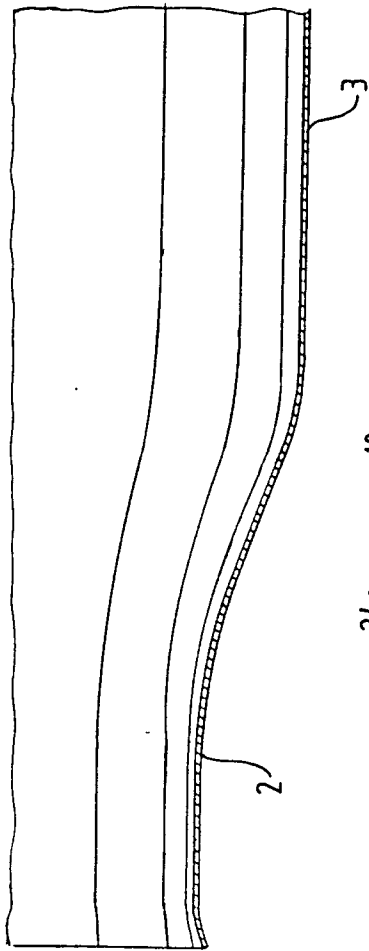


FIG. 4

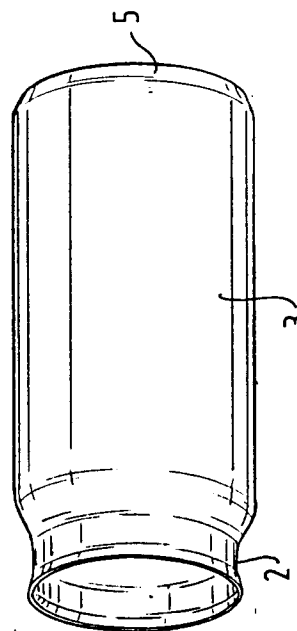


FIG. 5

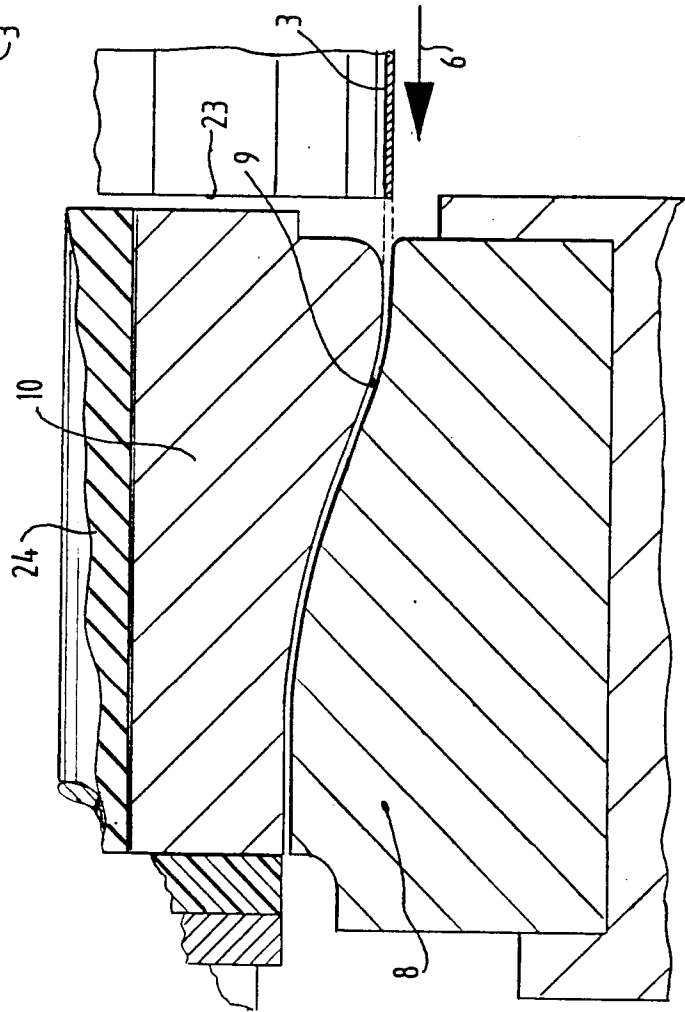


FIG. 3



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EUROPEAN SEARCH REPORT

Application Number

EP 92 20 0838

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-3 898 828 (AMERICAN CAN COMPANY) * the whole document * ---	1	B21D51/26
X	US-A-4 450 700 (REYNOLDS METALS COMPANY) * the whole document * ---	1	
X	US-A-1 842 447 (DISTER) * page 3, line 37 - page 4, line 57; figures 11,13 * ---	1	
A	FR-A-2 440 789 (SCHULER) ---		
A	US-A-3 754 424 (GULF & WESTERN INDUSTRIAL PRODUCTS COMPANY) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B21D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 02 JULY 1992	Examiner PEETERS L.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	