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Description

The invention relates to apparatus for closing containers especially containers made of aluminium foil.

In one type of known closing apparatus, such as that described in German Offenlegungsschrift 2 511 218, the closing apparatus comprised an upper and lower die, an aluminium foil container is placed on the lower die, a preformed aluminium foil cover is placed on the container and the apparatus is closed by relative vertical movement of the upper and lower die in such a way that the cover is secured to the container by bending the edges of the cover under the rim of the container.

In another similar type of closing apparatus shown in United States Patent 3 834 120 a sheet of foil material is fed into the die above the container and a cover cut to size by cutting means on initial closing movement of the die. The cutting means comprises a fixed knife secured to the die frame and a spring powered moving knife whose movement is controlled by an abutment of the lower die. Stop means are provided to prevent passing movement of the moving knife once the cover has been cut.

The arrangement of U.S. 3 834 120 has several disadvantages. The moving knife operates passively as the die closes and may move in an uncontrolled or imprecise manner especially if food debris is present. Aluminium foil material is very thin and fragile and a precise cutting arrangement is necessary for reliable repeatable foil shear. The prior art knife arrangement has a significant operating load not only from the springs which power the knife but also since the moving knife is biased into constant rubbing contact with the fixed knife, this arrangement has the possibility of high wear rates.

It is known from French Patent Publication 2 383 835 to provide a knife arrangement on a hand closing apparatus for foil containers. The two parts of the knife are not themselves connected and have no bias to ensure contact of the blades. Such an arrangement is unlikely to give a sufficiently reliable and repeatable shear with an automatic machine, e.g. U.S. 3 834 120.

According to the invention there is provided a closure mechanism for securing a foil cover to a foil container and comprising a lower die having a support for the foil container, an upper die having means responsive to relative movement between the upper and lower dies to secure a cover to the container, cutting means comprising a fixed knife secured to the upper die and a movable knife to cut the cover for the container on relative vertical movement between the dies and stop means adapted to prevent passing movement of said movable knife, as known from U.S. 3 834 120, characterised in that the movable knife is pivoted at one end of the fixed knife and connected at the other end by releasable detent means to the lower die for movement thereby, the fixed and movable knives being adapted to cut a cover by scissor action.

This arrangement gives a precise knife arrangement, positively controlled by movement of the lower die by virtue of the detent engagement of the movable knife and lower die. It also has the advantages of low operating load and a self-cleaning action. The blades may also be self-sharpening in the manner of the other scissor action knives.

In a preferred embodiment the stop means is adapted to disconnect said releasable detent means on closure of the fixed and movable knives.

The detent means may comprise a spring loaded rolling element bearing mounted on said lower die for engagement with a detent of the movable knife.

The stop means may be an abutment of the fixed knife.

The upper part of the die preferably includes means for compressing the sides of the cover around the rim of the container. Said compressing means may comprise a plurality of resilient frame members which are spaced apart when the die is open and means for compressing the resilient frame members together when the die closes whereby the edges of the cover can be secured under the rim of the container.

The resilient frame members may be made of nylon or other plastics material.

The upper part of the die may include rigid guides associated with the resilient frame members, said rigid guides being arranged to be moved inwards and thereby press the resilient frame members together. This arrangement may include tapered guides, which are adapted to push the rigid guides inwards as the rigid guides and associated resilient frame members are moved relative to the lower part of the die.

Preferably there are four resilient frame members of angled shape which together form a substantially rectangular shape and there are four rigid guides, one on each side of the rectangle.

The closure die may include guide means for the foil sheet, the guide means having slots into which the edges of the foil sheet fit; the slots being such that the foil sheet can be pushed out of the guides by relative movement of the upper and lower die parts and can be bent downwards as the edges leave the slots in the guide members. Means for carrying a roll of foil sheet material and for feeding foil sheet from a roll into the slotted guides may be provided.

The lower die part may include an inner frame and an outer frame, the inner frame being adapted to support a container which is to be closed and the outer frame being adapted to complete sealing of a cover on the container by compressing a bent edge of the cover under the rim of the container.

Other features of the invention are disclosed in the following description of a preferred embodiment shown, by way of example only, in the accompanying drawings in which:—

Figures 1 to 6 are end views partly in section, of an apparatus for closing containers showing the sequence of steps for effecting closure;

Figure 7 is a plan view of the closing die;

Figure 8 is a cross-section through part of the

die; and

Figure 9 is a view similar to Figure 1.

Referring now to the drawings in detail and Figures 7, 8 and 9 in particular, the closing die comprises a movable cut off knife 1, which is movable in an upward direction; the knife having a pivot 19 at one end (see Figures 1 to 6 and 9) and a notch 27 at the other end (see best in Figure 3). The notched end of the knife rests against a ball bearing 11, which is fixed to a tiltable support frame 10, which forms part of a lower die. There is a fixed knife 2 (see Figure 8) which serves as a cutting support for the knife 1. As seen in Figure 7 a resilient frame 4 (made of nylon), consisting of four individual sections normally biased apart by compression springs 26, has four shaped rigid guides 5 (made of steel) along its short and long sides. These guides 5 are used to compress the frame 4 and to give support to the relatively weak frame 4. Referring to Figure 1 there is a support plate 17 for the lower die which comprises an inner die frame 8 and an outer die frame 9. An ejector plate 14 has guide pins 13. The inner die frame 8 has loading springs 15. The upper die comprises a frame 3, the nylon frame 4 (see also Figure 7) and its steel guides 5. The nylon frame has cavities 20 for the compression springs 26 (see Figure 7). The upper die frame 3 has support posts 21 fixed to a carrying plate 22. The plate 22 has return springs 23. The upper die also has guide pins 24 and a support plate 25.

The closing die operates in the following way. Figure 1 shows the die in the open, or start position. An aluminium foil container 7 is placed on the ejector plate 14. Aluminium foil sheet 6 is fed from a roll (not shown) through guides 18 into the "fed" position (Figure 1) above the container 7 and under the upper die. The support frame 17 is moved upward (Figure 2) by rams 28 pushing the lower inner die frame 8 under the shoulder of the container 7 which is then lifted from the ejector plate 14.

The support frame 17 carries the ball bearing support frame 10 with it. The ball bearing 11 rotates against and guides the movable cut off knife 1 upwards about its pivot 19 so cutting the foil sheet 6 against the fixed knife edge 2 by means of a scissor action thus forming the foil cover for the container. The movable knife 1 meets a stopper pin 12 which causes the bearing 11 to leave the notch 27 of the knife 1 thus disconnecting the knife from the bearing 11 as seen in Figure 3. The foil container 7 moves under and engages the foil cover 6. The continued upward movement of the container 7 pulls the cover (6) out of its guide 18. This results in the edges of the cover 6 being bent downwards, on its two short sides as shown in Figure 4.

Referring now to Figures 3 to 5, the ball bearings 11 has left the notch 27 in knife completely while the knife rests against stopper pin 12. The foil container 7 with its cover 6 continues to move upwards supported and guided by the inner frame 8 of the lower die until it pushes against the frame 3 of the upper die and into the area of the

nylon frame 4. The nylon frame 4 is compressed by the tapered steel guides 5, thus moving inwards to bend the edge of the cover 6 under the shoulder of the container as shown in Figures 5 and 5a. The outer frame 9 of the lower die moves up under the ledge against the effect of springs 15, tightening the cover 6 under the shoulder of container 7 as shown in Figures 6 and 6a.

After closure the support 17 for the lower die is moved downwards, the notch 27 in knife 1 engages the bearing 11 and resets it to the start position shown in Figure 1. The closed container may be removed from the die preferably by automatic means and a fresh container inserted for closure.

In the above embodiment of the invention the combined thickness of the nylon frame 4 and the movable cut off knife 1 is equal to the width of foil sheet material 6 protruding beyond the rolled edge of the container. This width will depend on the size of container being sealed. For one particular size it amounted to 12 mm.

The apparatus described above has the advantage that the lid can be cut from a roll of foil and shaped during the closing operation.

Claims

1. A closure mechanism for securing a foil cover (6) to a foil container (7) and comprising a lower die (8) having a support for the foil container, an upper die (4) having means responsive to relative movement between the upper and lower dies to secure a cover to the container, cutting means comprising a fixed knife (2) secured to the upper die and a movable knife (1) to cut the cover for the container on relative vertical movement between the dies the stop means (12) adapted to prevent passing movement of said movable knife, characterised in that the movable knife (1), is pivoted at one end to the fixed knife (2) and connected at the other end by releasable detent means (11, 27) to the lower die for movement thereby, the fixed and movable knives (2, 1) being adapted to cut by scissor action.

2. A closure mechanism according to Claim 2, characterised thereby that said stop means (12) is adapted to discount said releasable detent means (11, 27) on closure of the fixed and movable knives (2, 1).

3. A closure mechanism according to Claim 2, characterised thereby that said releasable detent means comprises a spring loaded rolling element bearing (11) mounted on said lower die for engagement with a detent (27) of the movable knife.

4. A closure mechanism according to Claim 2 or Claim 3, characterised thereby that stop means comprises an abutment (12) of the fixed knife (2).

Patentansprüche

1. Verschlussvorrichtung zur Befestigung eines Foliendeckels (6) auf einem Folienbehälter (7), die einen unteren Stempel (8) mit einem Träger für

den Folienbehälter,

einen oberen Stempel (4), welcher Mittel besitzt, die auf die relative Bewegung zwischen dem oberen und unteren Stempel ansprechen, um einen Deckel auf dem Behälter zu befestigen,

Schneidemittel mit einem am oberen Stempel befestigten, feststehenden Messer (2) und mit einem beweglichen Messer (1) zum Schneiden des Deckels für den Behälter bei der relativen vertikalen Bewegung zwischen den Stempeln, und eine Stoppvorrichtung, die eine Weiterbewegung des bewegbaren Messers verhindert, aufweist,

dadurch gekennzeichnet, daß das bewegbare Messer (1) an einem Ende schwenkbar an dem feststehenden Messer (2) gelagert ist und an dem anderen Ende mittels einer lösbaren Arretierung mit dem unteren Stempel verbunden ist, um von diesem mitgenommen zu werden, wobei das feststehende und das bewegliche Messer (2, 1) so ausgestaltet sind, daß sie einen Deckel wie eine Schere schneiden.

2. Verschlussvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Stoppvorrichtung (12) die lösbare Arretierung (11, 27) beim Schließen des feststehenden und des bewegbaren Messer (2, 1) löst.

3. Verschlussvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die lösbare Arretierung ein federbelastetes, rollendes Lagerelement (11) aufweist, das an dem unteren Stempel befestigt ist und in eine Arretiernut (27) an dem bewegbaren Messer eingreift.

4. Verschlussvorrichtung nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die Stoppvorrichtung einen Anschlag (12) an dem feststehenden Messer (2) aufweist.

Revendications

1. Mécanisme de fermeture destiné à fixer un couvercle (6) en feuille sur un récipient (7) en feuille, et comprenant un outil inférieur (8) comportant un support pour le récipient en feuille, un outil supérieur (4) comportant des moyens qui, en réponse à un mouvement relatif entre les outils supérieur et inférieur, fixent un couvercle sur le récipient, des moyens de découpage comprenant un couteau fixe (2) assujéti à l'outil supérieur et un couteau mobile (1) destiné à découper le couvercle pour le récipient lors d'un mouvement vertical relatif entre les outils, et des moyens d'arrêt (12) conçus pour empêcher ledit couteau mobile de passer, caractérisé en ce que le couteau mobile (1) pivote par une première extrémité sur le couteau fixe (2) et est relié, par son autre extrémité et à l'aide de moyens d'encliquetage amovibles (11, 27) à l'outil inférieur afin d'être déplacés par celui-ci, les couteaux fixe et mobile (2, 1) étant conçus pour découper un couvercle par une action de ciseau.

2. Mécanisme de fermeture selon la revendication 1, caractérisé en ce que lesdits moyens d'arrêt (12) sont conçus pour désolidariser lesdits moyens d'encliquetage amovibles (11, 27) lorsque les couteaux fixe et mobile (2, 1) se ferment.

3. Mécanisme de fermeture selon la revendication 2, caractérisé en ce que lesdits moyens d'encliquetage amovibles comprennent un palier (11) à éléments roulants chargé par ressort, monté sur ledit outil inférieur afin de s'enclencher avec un organe d'arrêt (27) du couteau mobile.

4. Mécanisme de fermeture selon la revendication 2 ou la revendication 3, caractérisé en ce que lesdits moyens d'arrêt comprennent une butée (12) du couteau fixe (2).

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FIG. 1.

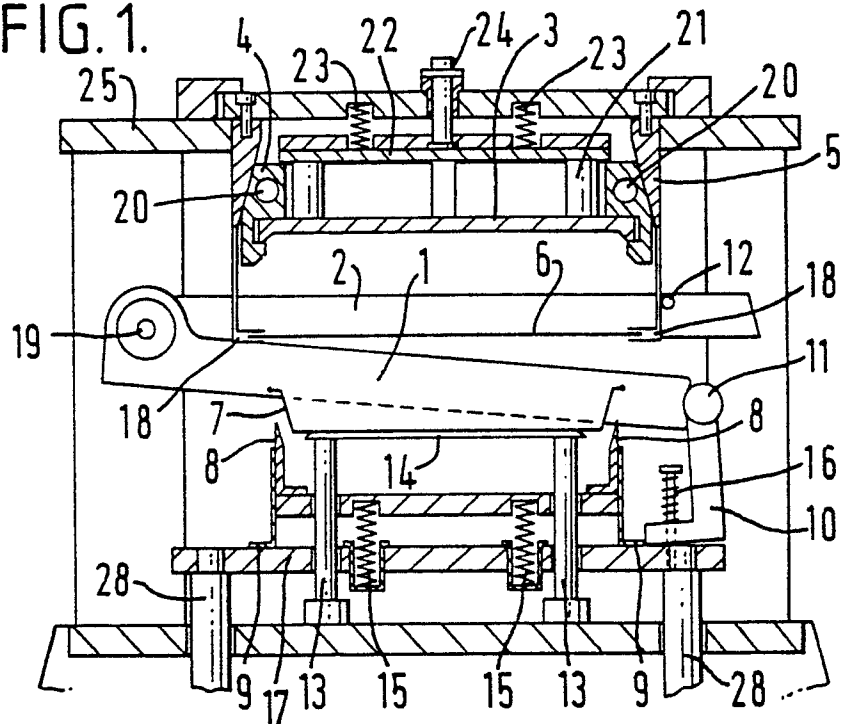


FIG. 2.

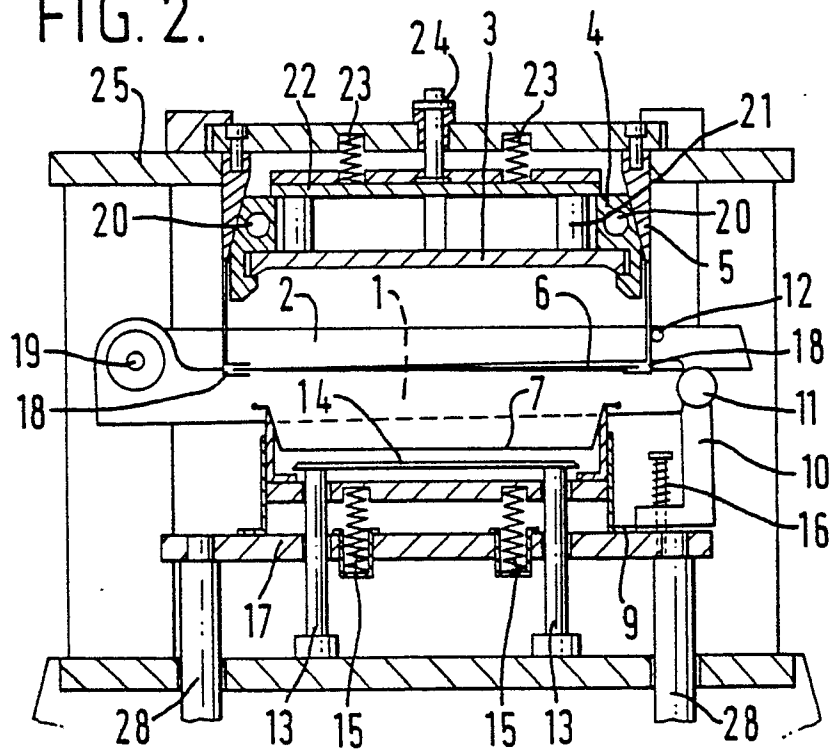


FIG. 3.

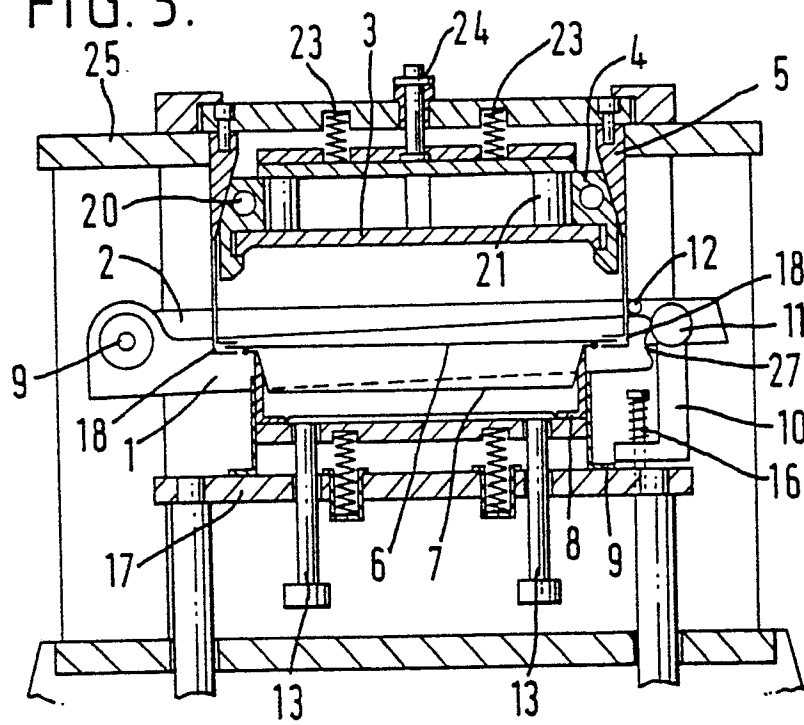
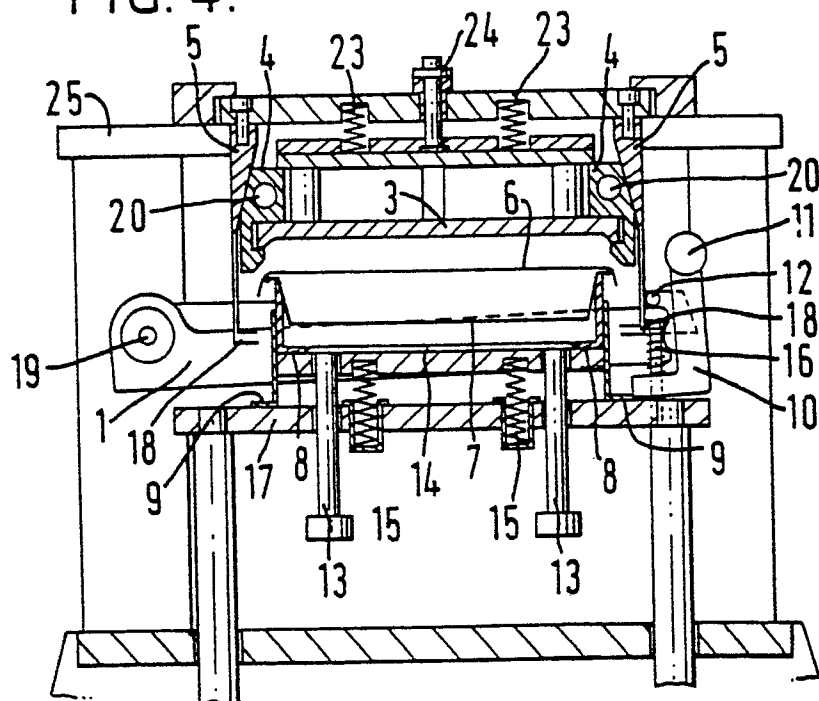


FIG. 4.



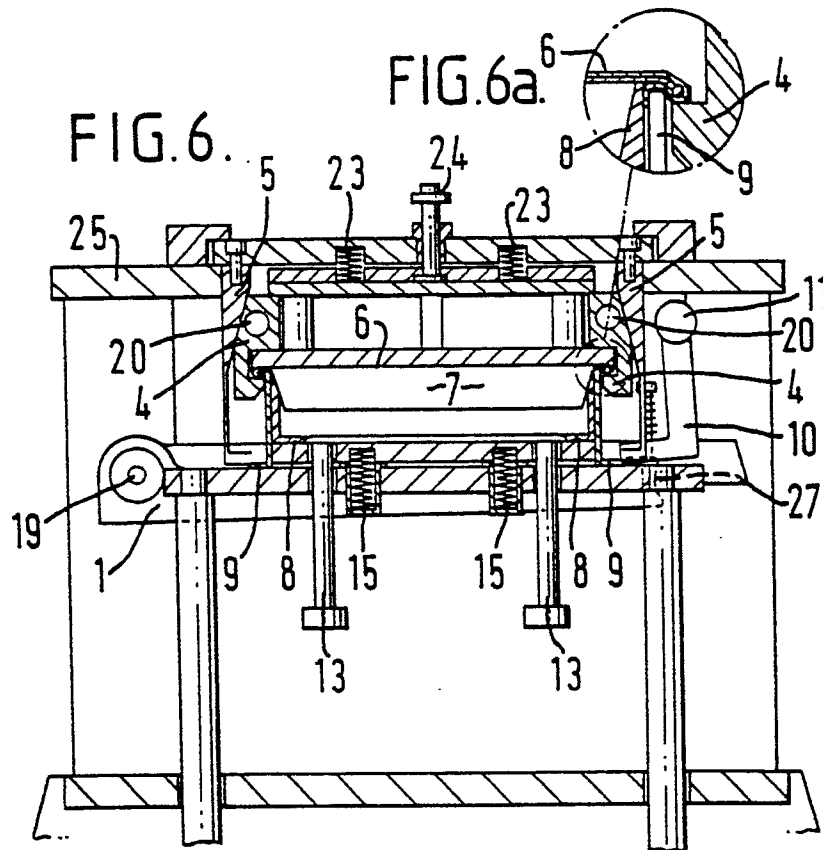
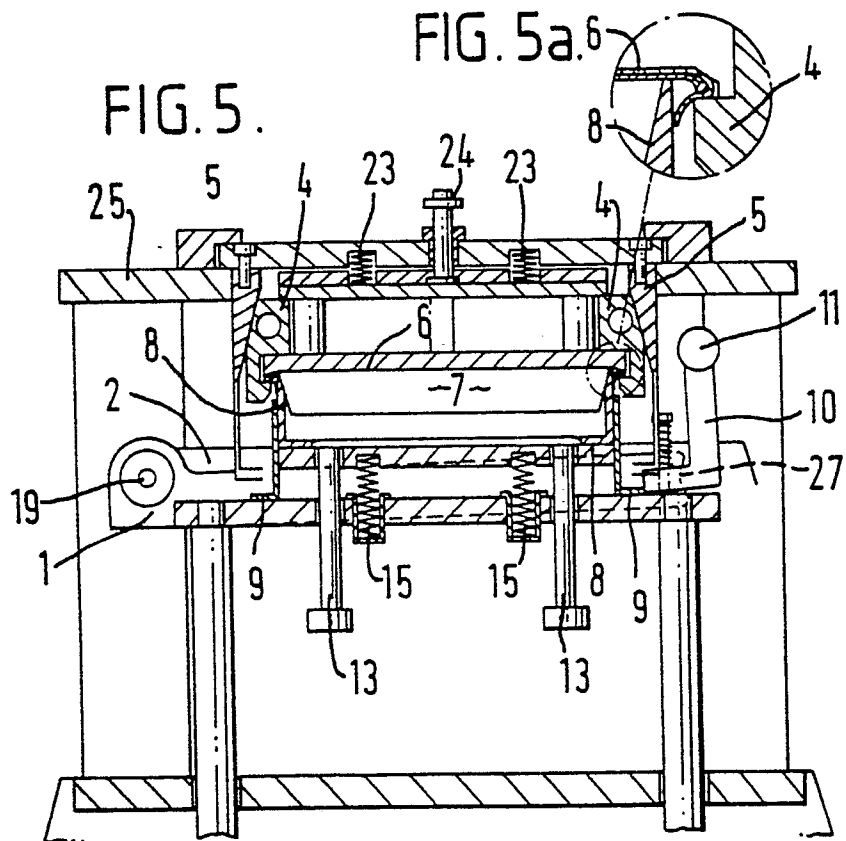


FIG. 7.

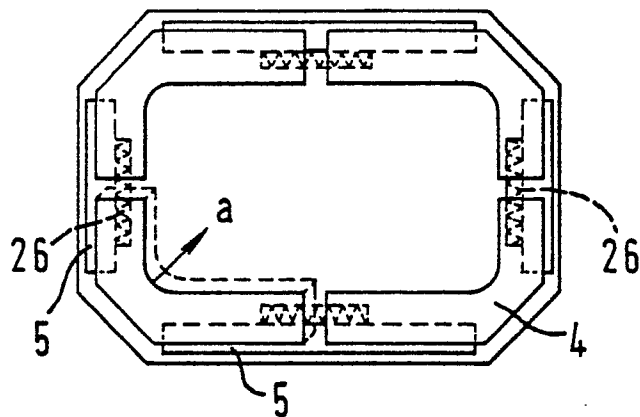


FIG. 8.

