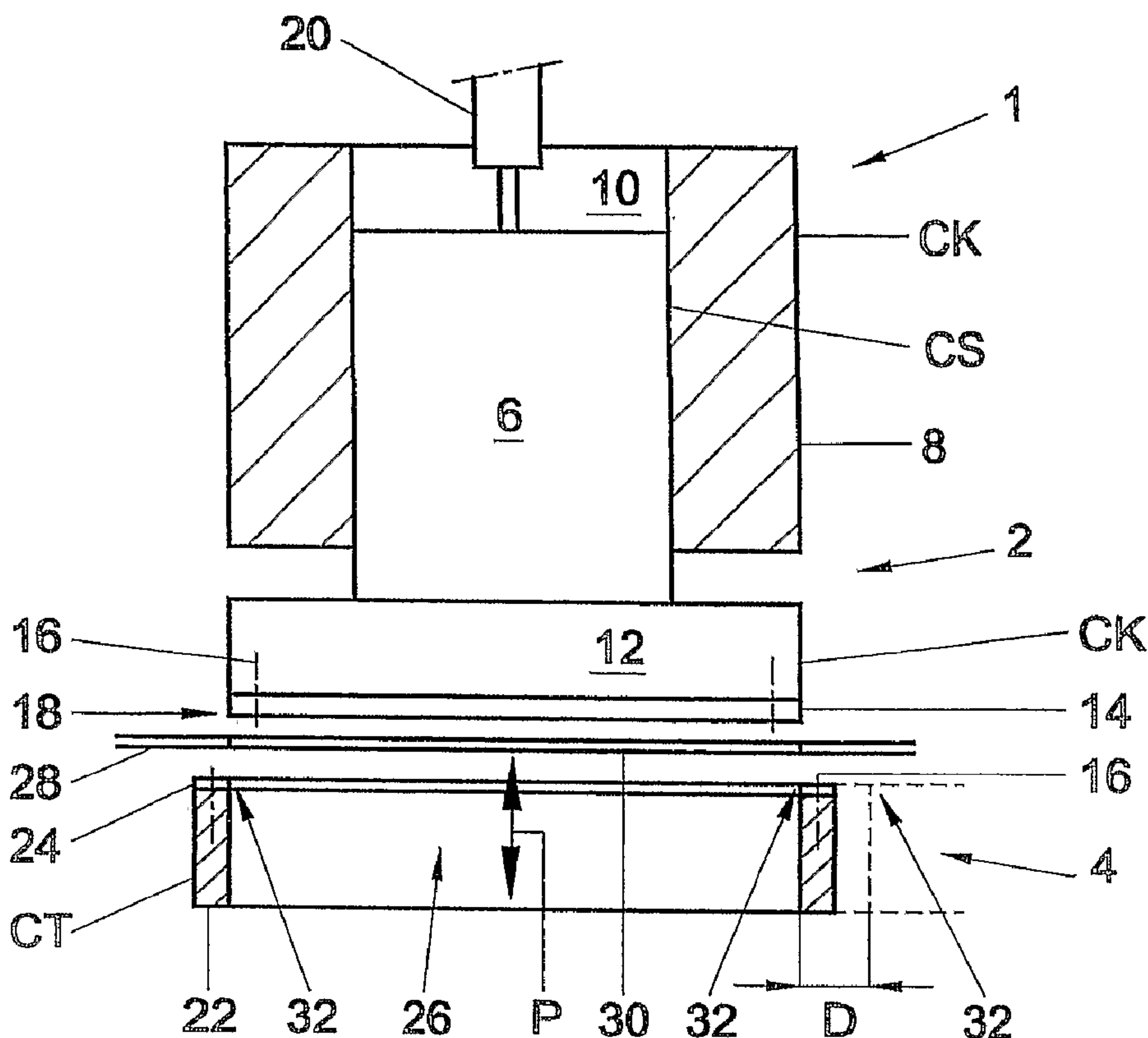




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(54) Titre : APPAREIL DE DECOUPAGE, PARTICULIEREMENT ADAPTE POUR FORMER DES ETIQUETTES ET DES ELEMENTS EN FEUILLE DU MEME TYPE
 (54) Title: PUNCHING APPARATUS, PARTICULARLY SUITABLE FOR FORMING LABELS AND SUCH FOIL ELEMENTS



(57) Abrégé/Abstract:

A punching apparatus (1) with a punch (2), provided with a guide part (6), guided in at least one guide element (8), the guide part supporting a punching edge (18) near a first end, leading in the direction of movement of the punch, and a manufacturing

(57) **Abrégé(suite)/Abstract(continued):**

apparatus for products, comprising a multiple tool part for simultaneously forming, at least processing, a series of products, punches being arranged with respect to each other such that the position of foil elements cut out during use corresponds to the position in which they are to be placed on or in the tool part.

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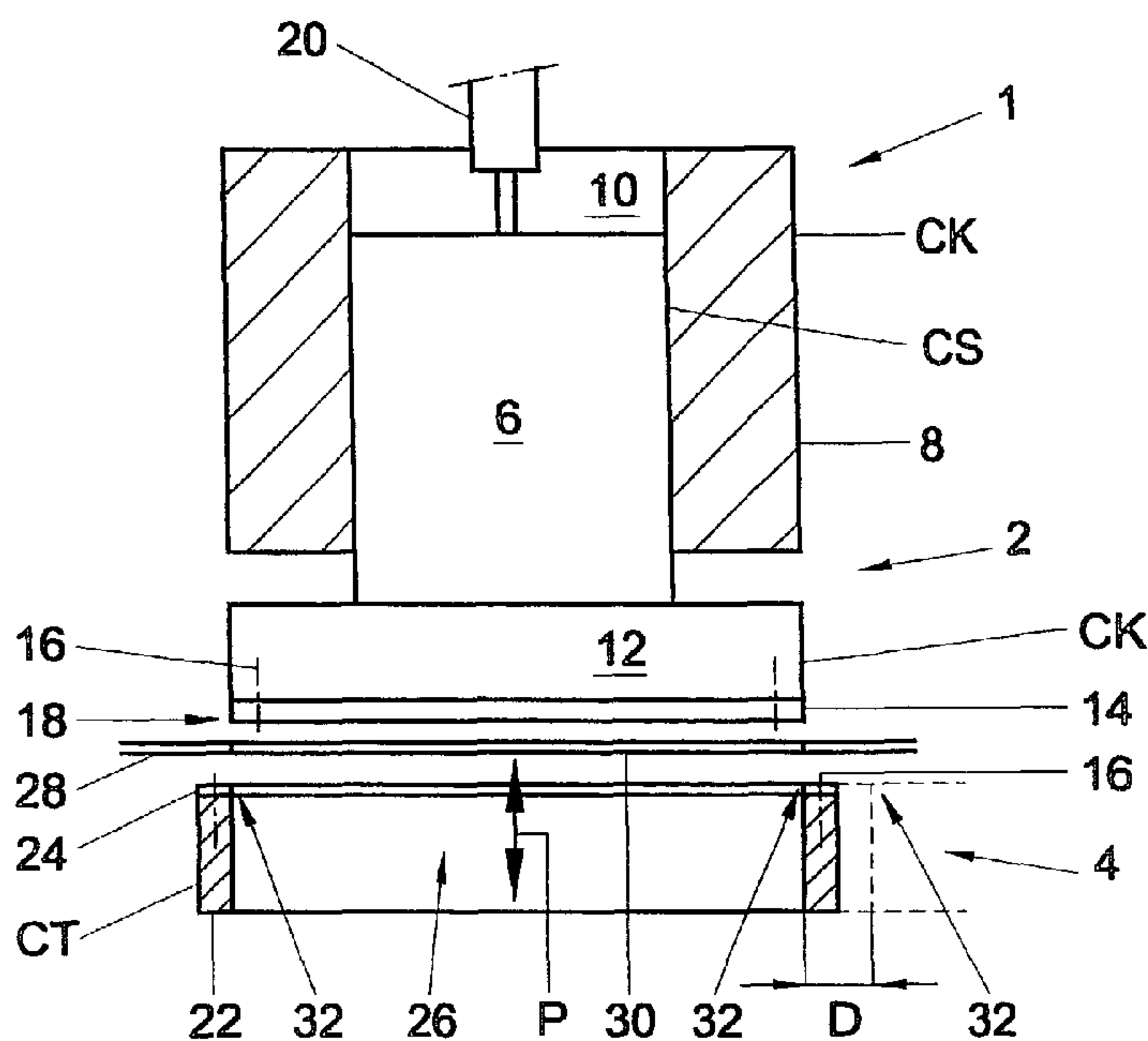
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(54) Title: PUNCHING APPARATUS, PARTICULARLY SUITABLE FOR FORMING LABELS AND SUCH FOIL ELEMENTS



(57) Abstract: A punching apparatus (1) with a punch (2), provided with a guide part (6), guided in at least one guide element (8), the guide part supporting a punching edge (18) near a first end, leading in the direction of movement of the punch, and a manufacturing apparatus for products, comprising a multiple tool part for simultaneously forming, at least processing, a series of products, punches being arranged with respect to each other such that the position of foil elements cut out during use corresponds to the position in which they are to be placed on or in the tool part.



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Title: Punching apparatus, particularly suitable for forming labels and such foil elements

The invention relates to a punching apparatus, particularly suitable for forming
5 labels and such foil elements. Such a punching apparatus is known from practice.

This known punching apparatus comprises a punch and a punching table. The
punch comprises a punching edge, and the punching table comprises a complementary
punching opening. The punch is provided with a punching plate, which is provided at
its longitudinal edge with a guide block in at least four spaced positions. Each guide
10 block comprises a cylindrical opening, through which a guide bar extends. The at
least four guide bars extend parallel to each other and are fixed with their ends, on the
one hand in the punching table, and on the other hand in a frame part. This results in
a relatively rigid construction. The guide plate can be moved by means of hydraulic
means such that the punching edge can be fittingly moved in the punching opening,
15 guided by the guide blocks, so that a label can be punched out of a foil strip passed
between the punching edge and the punching opening.

This known punching apparatus has the drawback that it has a relatively
complex structure and, seen at right angles to the direction of movement of the punch,
has a very large outer contour. This means that such a punching apparatus requires a
20 relatively large mounting surface.

The invention has for its object to provide a punching apparatus of the type
described in the opening paragraph, in which the above drawbacks are avoided, with
retention of the advantages thereof. To this end, the invention provides a punching
apparatus for forming labels comprising: a punch, provided with a guide part, guided
25 in at least one guide element, the guide part supporting a punching edge near a first
end, leading in the direction of movement of the punch; a punching table defining a
punching opening for cooperating with said punching edge to form a punched label;
and a movable transferring apparatus having a receiving means for receiving the
punched label from said punching opening of said punching table and transferring the
30 label into a mold cavity.

In an apparatus according to the invention, the punching edge is directly supported by a guide part of the punch, which is guided by at least one guide element. This has the advantage that a substantially less complex punching apparatus is obtained, which, moreover, can be of more compact construction.

5 In a first advantageous embodiment, a punching apparatus according to the invention is further characterized by the at least one guide element, seen in a view at right angles to the direction of movement of the punch, is located within the outer contour of the punching table.

In such an embodiment, the outside dimensions of the punching apparatus, seen at right angles to the direction of movement of the punch, is only defined by the punching table, since the or each guide element is located within the outer contour of the punching table. It is preferred that the or each guide element, in a plane at right angles to the direction of movement of the punch, is located within the outer contour of the punching edge. This results in an even more compact structure.

15 In a further advantageous embodiment, a punching apparatus according to the invention is further characterized by the at least one guide element or the at least one guide part are provided with a friction-reducing coating.

In such an embodiment, the guide part and the at least one guide element may be in direct contact for the formation of a sliding fit.

20 In a punching apparatus according to the invention, the guide element can be of substantially tubular design, built up from one or more parts, the guide part being movable within the above tubular part with a sliding fit. This results in a very simple and compact guide. Also, precisely the guide part may comprise a tubular part in which the or each guide element extends with a sliding fit. It is preferred that the or each guide element extends via an open end in the above guide part.

25 In a further advantageous embodiment, a punching apparatus according to the invention is characterized by the guide part, near the first end, is provided with a widened head, which head supports the punching edge.

The widened head offers the space for positioning the punching edge, the at least one guide element being able to be arranged simply around at least part of the

30

further guide part, substantially within the outer contour of the above head. In such an embodiment, the above guide element may be of, for instance, tubular design, as described above.

5 A first and a second punching plate may be provided on respectively the punch and the punching table, with complementary punching edges. Such first and second punching plates may be simply exchangeable, for instance in order that they can be ground or replaced. The form of the labels to be cut out may be simply fixed in the first and the second punching plate, so that they are to be exchanged only if a change to another form is effected.

10 It is preferred that within a punching apparatus according to the invention a punching table has an outer contour, in a plane at right angles to the direction of movement, which surrounds the punching opening at only a slight distance. Preferably, the minimum distance between the outer contour of the punching table (which, for instance, may be of rectangular design) and the nearby contour of the punching opening is about 20 mm or less. This considerably limits installation
15 dimensions for the relevant punching table.

In a further advantageous embodiment, a punching apparatus according to the invention is further characterized by two punches placed side by side with parallel directions of movement.

20 With such a punching apparatus, several labels or such foil elements can be simply punched out simultaneously. As a result of the compact structure, in particular the small outside dimensions of the punching tables and the punches with guide elements, at right angles to the direction of movement, the punching openings can be placed side by side with a relatively small intermediate distance and can be positioned
25 independently of each other, so that the foil elements can likewise be punched out with a small mutual distance. This has the advantage of relatively little waste material, while the relevant foil elements can be simply transferred to, for instance, mold cavities of a multiple mold, which mold cavities can then be placed relatively closely together without requiring adaptation of the distance between the labels prior
30 to placement. This has the advantage that a multiple mold can be used for, for

instance, the manufacture of in-mold-labeled injections moldings with a relatively small mating surface.

It is preferred that in or near each punching opening receiving means are provided for gripping a foil element punched out in the relevant punching opening, so that this can be simply removed and brought into, or kept in, the desired form, for instance for transfer to a further tool part.

In an advantageous embodiment, a punching apparatus according to the invention has such an arrangement that the or each punch has a substantially horizontal direction of movement. Such an apparatus has the advantage that during use with molds with vertically extending mating surfaces the transfer of the foil elements from the punching openings to the relevant mold cavities is substantially simplified.

The invention further relates to a manufacturing apparatus for products characterized by a multiple tool part for simultaneously forming, at least processing a series of products and a punching apparatus of the invention of two punches placed side by side with parallel directions of movement, the punches being so arranged that the position of foil elements cut out during use corresponds to the positioning in or on the tool part.

With such a manufacturing apparatus, products can be formed very rapidly, that is to say with short cycle times, while using punched foil elements, the foil elements being able to be placed in or on the relevant tool part in a very simple manner. Since the position of the punched labels corresponds to that in which they are to be placed on or in the relevant tool part, an intermediate change of position is not necessary. As a result, complicated transferring apparatuses are superfluous.

The invention further relates to a punch, suitable and intended for use in a punching apparatus of manufacturing apparatus according to the invention.

In a very advantageous embodiment, such a punch is characterized by the above contour being non-rectangular.

In such an embodiment, the advantage is obtained that all kinds of different punching edges, at least punching plates with such punching edges, can be used with a

punch, without the need of using guide parts and guide elements of another form. This results in a universal punch, which can be simply adjusted to different forms of foil elements to be formed and different materials from which they are to be punched.

In explanation of the invention, exemplary embodiments of a punching apparatus, manufacturing apparatus and punch according to the invention will be explained in more detail with reference to the drawing, in which:

Fig. 1 diagrammatically shows, in cross-sectional view along the line I-I in Fig. 2, a punching apparatus according to the invention;

Fig. 2 shows, in top plan view, a punching apparatus of Fig. 1, as part of a diagrammatically represented part of a manufacturing apparatus according to the invention;

Fig. 3 diagrammatically shows, in partially cross-sectional side elevation, comparable to that in Fig. 1, an alternative embodiment of a punch with guide element according to the invention;

Fig. 4 diagrammatically shows, in cross-sectional side elevation, a manufacturing apparatus according to the invention; and

Fig. 5 diagrammatically shows, in cross-sectional side elevation, comparable to that in Fig. 1, a further alternative embodiment of a punch with guide element according to the invention.

In Fig. 1 is shown a punching apparatus 1 according to the invention, in partially cross-sectional side elevation. This punching apparatus 1 comprises a punch 2 and a punching table 4. The punch 2 comprises a guide part 6, which is substantially of solid design, for instance in metal such as steel, with a substantially rectangular contour CS when seen at right angles to the direction of movement P of punch 2. Provided around the guide part 6 is a tubular guide element 8 with a continuous opening 10, in which the guide part 6 is fittingly received with a sliding fit and is movable therein in the above direction of movement P. The guide part 6 and/or the wall parts of the opening 10 of the guide element 8 in contact therewith are preferably provided with a friction-reducing coating, for instance a Teflon* (PTFE)-based coating, so that movement is possible, and remains possible for a long time,

*Trade-mark

without damage, wear or jamming, and without excessive forces.

Mounted to a first, in Fig. 1 lower, end of the guide part 6 is a head 12, for instance by welding or screwing, or formed integral therewith, which head 12 has an outer contour CK, which surrounds the outer contour CS of the guide part 6 at some distance. The outer contour CK of the head 12 is, for instance, approximately equal to that of the guide element 8. At the side of the head 12 remote from the guide part 6, a first punching plate 14 is fixed to the head 12, for instance with screws 16, so that the punching plate 14 is exchangeable for another first punching plate. The first punching plate 14 defines, along its outer circumference, a punching edge 18, which can be simply ground, preferably when the punching plate 14 has been detached.

Near the superjacent second end, the guide part 6 is connected with an operating mechanism, symbolically represented by a piston-cylinder assembly 20, with which the punch 2 is movable.

The punching table 4 is substantially formed by an edge 22, which is provided at the side directed towards the punch 2 with a second punching plate 24, likewise fixed with screws 16 or the like, so as to be simply exchangeable for another second punching plate. The first and the second punching plate 14, 24 are preferably manufactured from thin sheet material and can be recycled. The punching table 4, at least the second punching plate 24, defines a punching opening 26, which has a form complementary to that of the punching edge 18 of the first punching plate 14, for punching cooperation therewith. The edge 22 has, measured at right angles to the direction of movement P of the punch 2, a small dimension, for instance 10 to 20 mm or less. The purpose thereof will be explained lower down.

In Fig. 1 is shown, between the first 14 and the second punching plate 24, a foil strip 28. The punch 2 is located at a first side thereof, the punching opening 26 at the opposite side. By moving the first punching plate 14 with the punch 2 through the foil strip 28 into the punching opening 26, a label 30 is punched out, which can be removed in the punching opening.

As clearly shown in Fig. 2, the whole punch 2 extends, in top plan view, within the outer contour CT of the punching table 4, like the punching edge 18 of the

first punching plate 14 and the guide element 6. As, for instance, shown in Figs. 1 and 4, punching apparatuses 1, in particular punching tables 4, can thus be moved closely together, so that the distance D between the cutting edges 32 of two juxtaposed punching openings 26 is defined by twice the thickness of the edge 22, that is to say for instance 20 to 40 mm. This ensures that labels can be punched out of foil strips 28 closely together and be transferred to tool parts such as mold cavities, as will be explained lower down.

In Fig. 3 is shown, in diagrammatic cross-section, an alternative embodiment of a punching apparatus 1, at least a punch 2 according to the invention. In this embodiment, the guide part 6 comprises a tubular part 7, within which a block-shaped guide element 8 is received with a sliding fit. Movement means 20 are provided for moving the punch 7 along the guide element 8 in the direction of movement P . In this embodiment, the punch 7 has a substantially U-shaped cross-section, the first punching plate 14 being fixed to the horizontal part 12A of the relevant U. Again, guide element 8 and/or guide part 6 are provided with a friction-reducing coating. As shown in Fig. 3 at the right-hand side, the first punching plate 14 may also extend outside the outer contour CK of the punch 7.

In Fig. 5 is shown a further alternative embodiment of a punching apparatus 1 according to the invention, the guide part 8 and the punching table 4 being interconnected and preferably formed integral as a substantially tubular profile 40. At two opposite sides, openings 5 are provided above the punching table 4 for passing foil strips. The punch 7 is of block-shaped design and received within the profile 40 with a sliding fit, movable in the direction P by means of the means 20a. Here the relevant block also forms the guide part 6. Mounted to a first lower end of the punch 7 is a first punching plate 14, the outer contour CK of which is a little smaller than the outer contour of the guide part 6. An edge is provided for the formation of the second cutting plate 24, at least the punching opening 26, qua form complementary to the first punching plate 14. The thickness of the wall of the tubular profile 40 is relatively small, for instance a $1/2D$, so that two profiles 40 moved together result in a common wall thickness D , as shown in Fig. 1.

In Fig. 4 is shown, in diagrammatic cross-section, a multiple injection mold 50, which comprises a first mold half 52 and a second mold half 54. Provided in the first mold half 52 are two mold cavities 56, provided with diagrammatically represented vacuum means 58 in the bottom, for gripping labels 30. Provided in the
5 second mold half 54 are feeding means 60 for feeding plastic into the mold cavity. Two punching apparatuses 1 are shown side by side, with parallel, substantially horizontally oriented directions of movement P for the punches 2. The associated punching tables 4 are arranged so as to be able to cooperate with the punches 2. To simplify matters, the movement means 20 and the foil strips 28 are left out here.
10 Provided at the side of the second punching plates 24 remote from the punches 2 is a transferring apparatus 62, movable by means of an arm 11, which transferring apparatus 62 is provided with receiving means 64, which

can be moved into juxtaposed punching openings 26, for gripping labels 30 formed therein. Such a receiving and transferring apparatus is described in the international patent application filed on the same day, entitled:

"punching apparatus, particularly suitable for forming labels and such foil elements" from the same applicant, which is inserted herein by reference, at least as far as the transferring apparatus 62 is concerned, also referred to therein as retaining means. The receiving means 64 are, for instance,

vacuum controlled. As shown in Fig. 4, the mutual distance between the receiving means 64 is equal to the mutual distance between the cavities 56.

Labels 30 formed with the punching apparatuses 1 can therefore be directly placed in the cavity 56 without a mutual change of position, following which, after removing the transferring apparatus 62, which is movable in the direction R between the mold halves 52, 54, the mold is closed to form in-mold-labeled products. As a result, molds 50 with relatively small mating surfaces become possible, and relatively short cycle times can be obtained.

As appears from the drawing, punching apparatuses 1 according to the invention may comprise both horizontally and vertically moving punches 2. It will be clear that other angles to the horizontal are possible as well.

In the exemplary embodiments shown, each punching plate 14, 24 has a substantially rectangular form. It will be clear, however, that they may also have a form different therefrom. The guide parts preferably have a non-rotation-symmetric outer contour, so that movement thereof is only possible in the direction of movement P, while rotations and other translations can be simply prevented. As long as the punching plates 14, 24 have an outer contour within which the outer contour of the punch falls, very efficient use is made of available space.

It will be clear that the invention is in no way limited to the exemplary embodiments described in the specification and shown in the

examples. Many variations thereof are possible within the scope of the invention defined by the claims.

Thus, guide parts and guide elements may be of different construction, for instance built up from several parts, and of, for instance, completely or partly hollow design. The guide elements need not define a completely closed form, but may also contain profiles extending within the contour of the punching edges. By way of alternative for, for instance, the embodiment shown in Fig. 3, for instance several guide elements may be received in the guide part with sliding fits. For the guide elements and guide parts, any desired material may be selected. Also, the edge 22 and the punch 2 may be directly provided with punching edges 18, 32, instead of the punching plates.

These and many comparable variations are deemed to fall within the scope of the invention defined by the claims.

CLAIMS:

1. A punching apparatus for forming labels comprising:
 - a punch, provided with a guide part, guided in at least one guide element, the guide part supporting a punching edge near a first end, leading in the direction of movement of the punch;
 - a punching table defining a punching opening for cooperating with said punching edge to form a punched label; and
 - a movable transferring apparatus having a receiving means for receiving the punched label from said punching opening of said punching table and transferring the label into a mold cavity.
2. A punching apparatus according to claim 1, wherein the at least one guide element, seen in a view at right angles to the direction of movement of the punch, is located within the outer contour of the punching table.
3. A punching apparatus according to claim 1, wherein the at least one guide element, seen in a view at right angles to the direction of movement of the punch, is located within the outer contour of the punching edge.
4. A punching apparatus according to claim 1, wherein the at least one guide element or the at least one guide part are provided with a friction-reducing coating.
5. A punching apparatus according to claim 1, wherein the guide element is of substantially tubular design, provided with an opening in which the guide part is received with a sliding fit.
6. A punching apparatus according to claim 1, wherein the guide part, near the first end, is provided with a widened head, which head supports the punching edge.

7. A punching apparatus according to claim 6, wherein, seen in a plane at right angles to the direction of movement of the punch, the at least one guide element is located within the contour of the head.
8. A punching apparatus according to claim 1, wherein the guide part is provided with a first punching plate, which defines the punching edge.
9. A punching apparatus according to claim 8, wherein the first punching plate is exchangeable for another first punching plate.
10. A punching apparatus according to claim 1, wherein the guide part is of substantially solid design.
11. A punching apparatus according to claim 1, wherein the at least one guide element is of substantially solid design.
12. A punching apparatus according to claim 1, wherein the guide part has an asymmetrical cross-section, seen at right angles to the direction of movement of the punch, such that the punch can move within the at least one guide element only in the direction of movement.
13. A punching apparatus for forming labels comprising:
 - a punch movable in a direction of movement, said punch having a guide part and a punching edge disposed on a first end thereof, said punching edge defining an outer contour perpendicular to said direction of movement; and
 - a tubular guide element having an opening defined therein for slidably receiving said punch guide part and having an outer contour perpendicular to said direction of movement, said outer contour of said guide element being located within said outer contour of said punching edge when viewed in said direction of movement.

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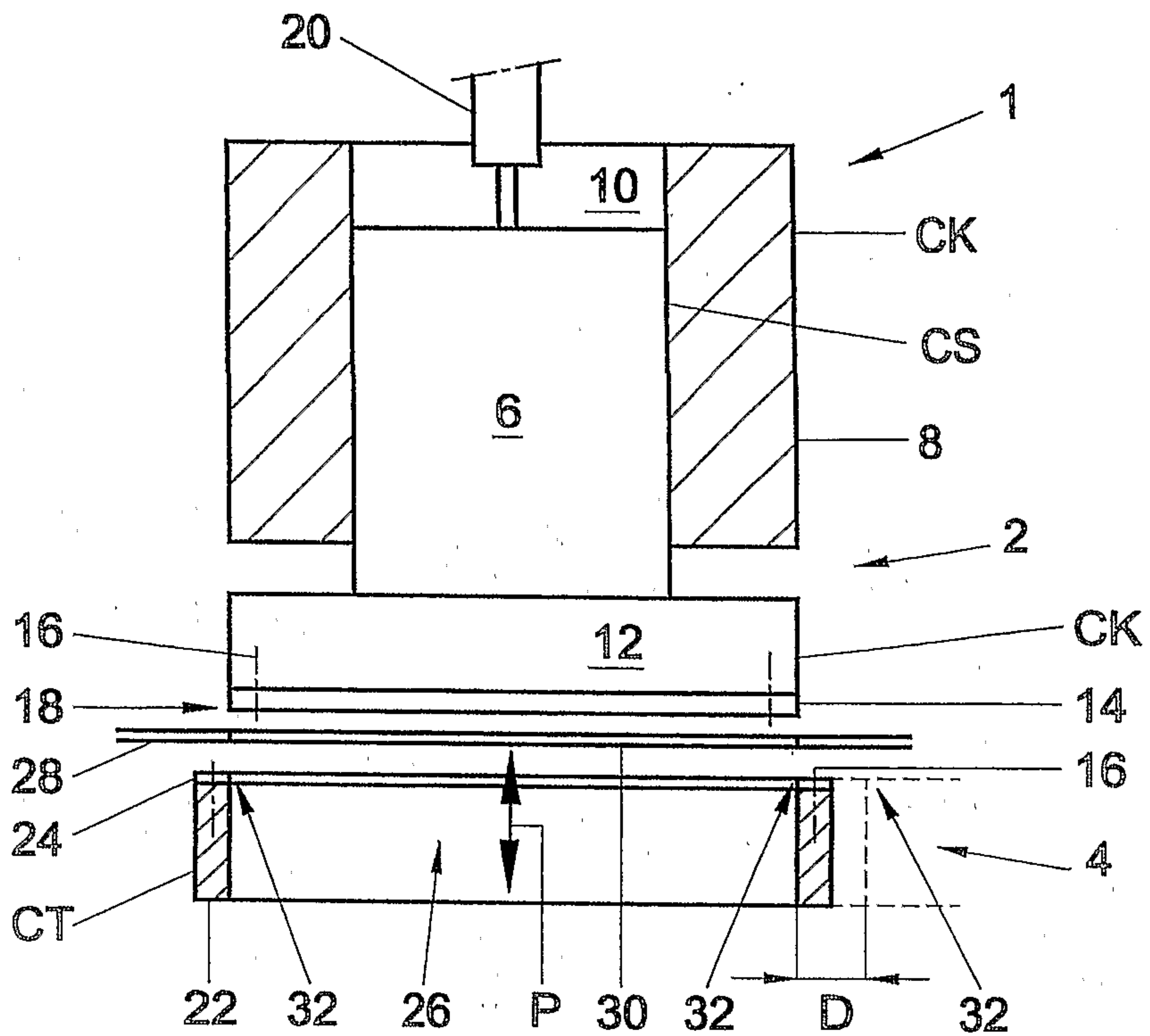


Fig. 1

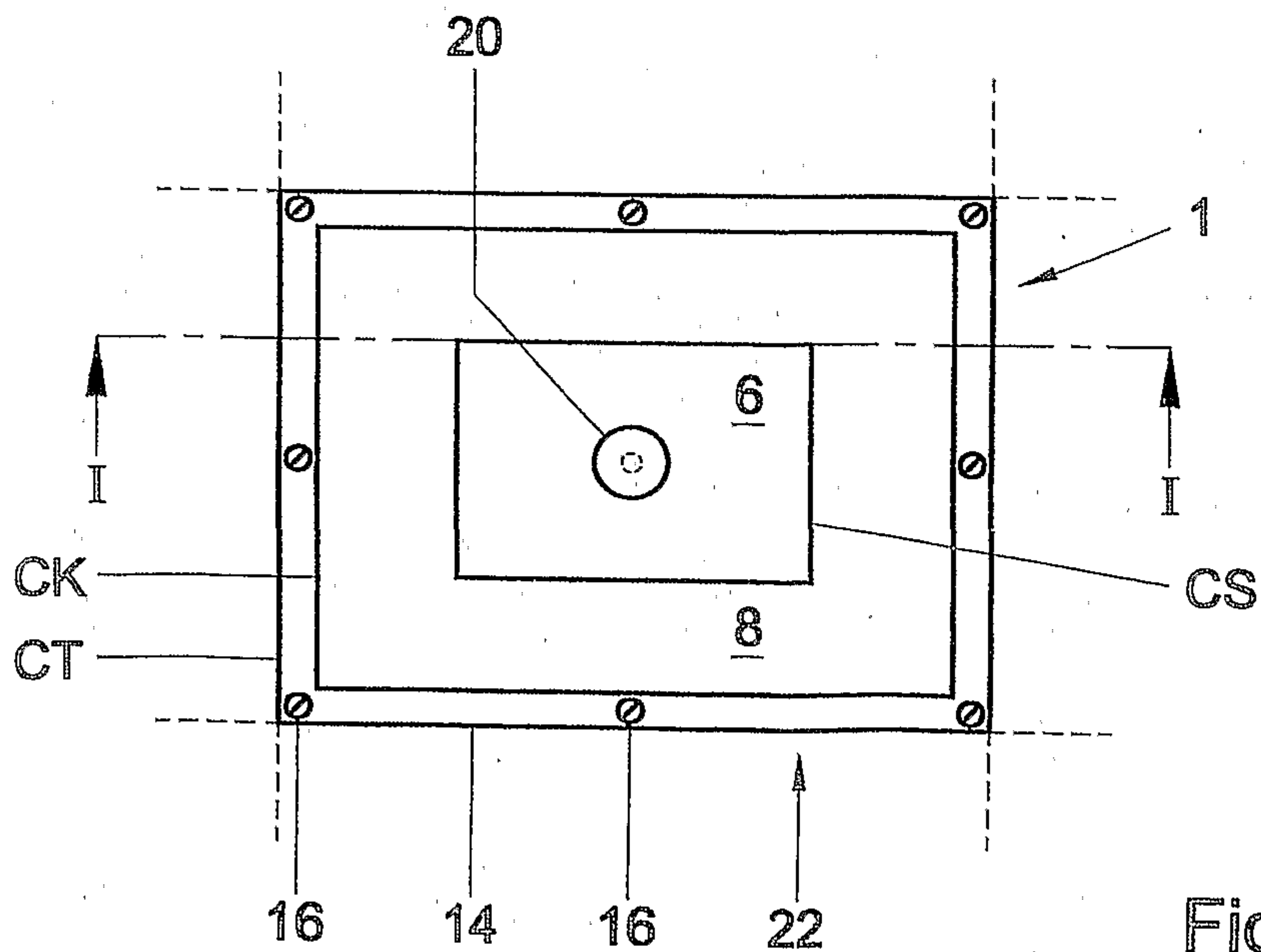


Fig. 2

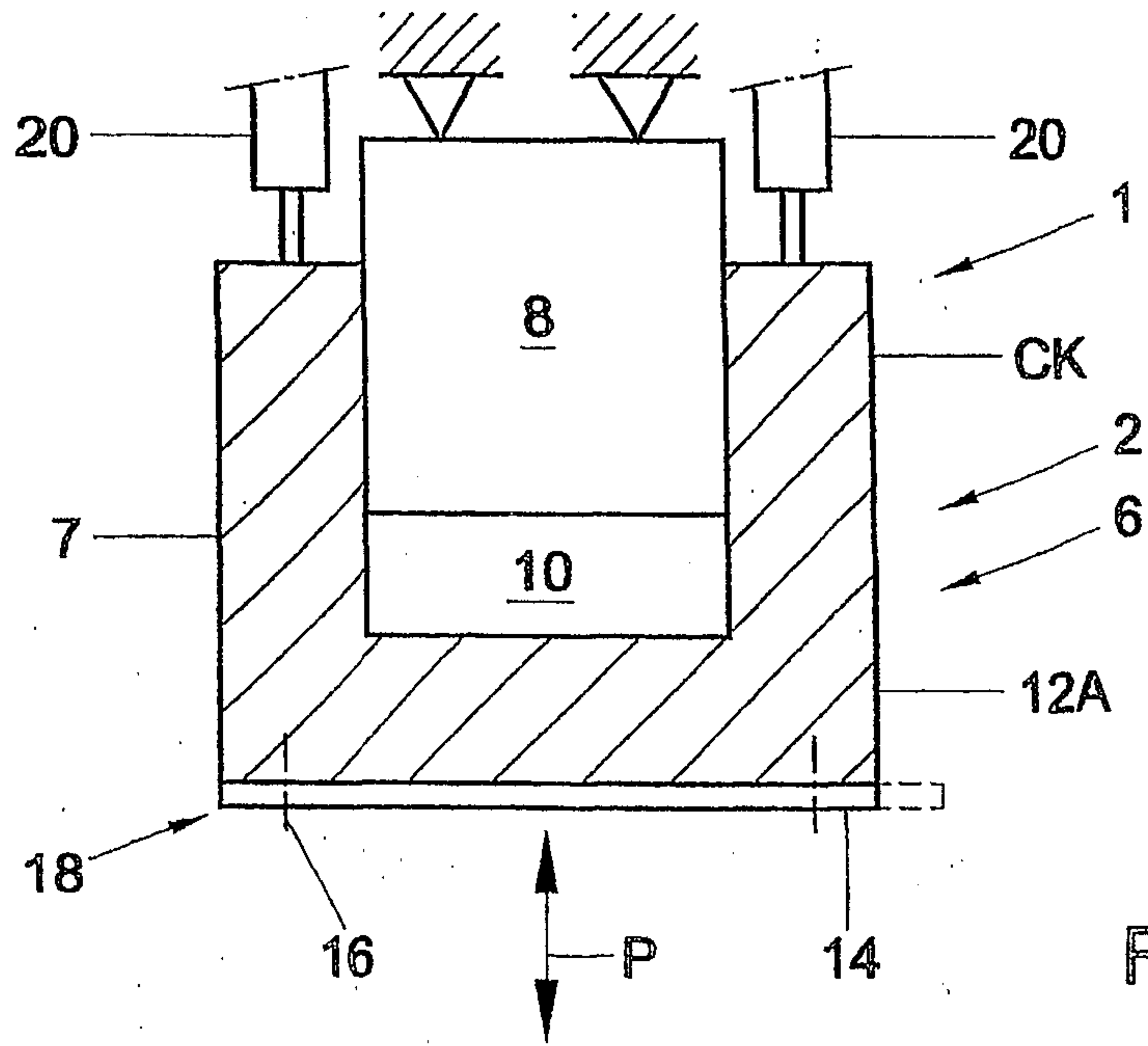


Fig. 3

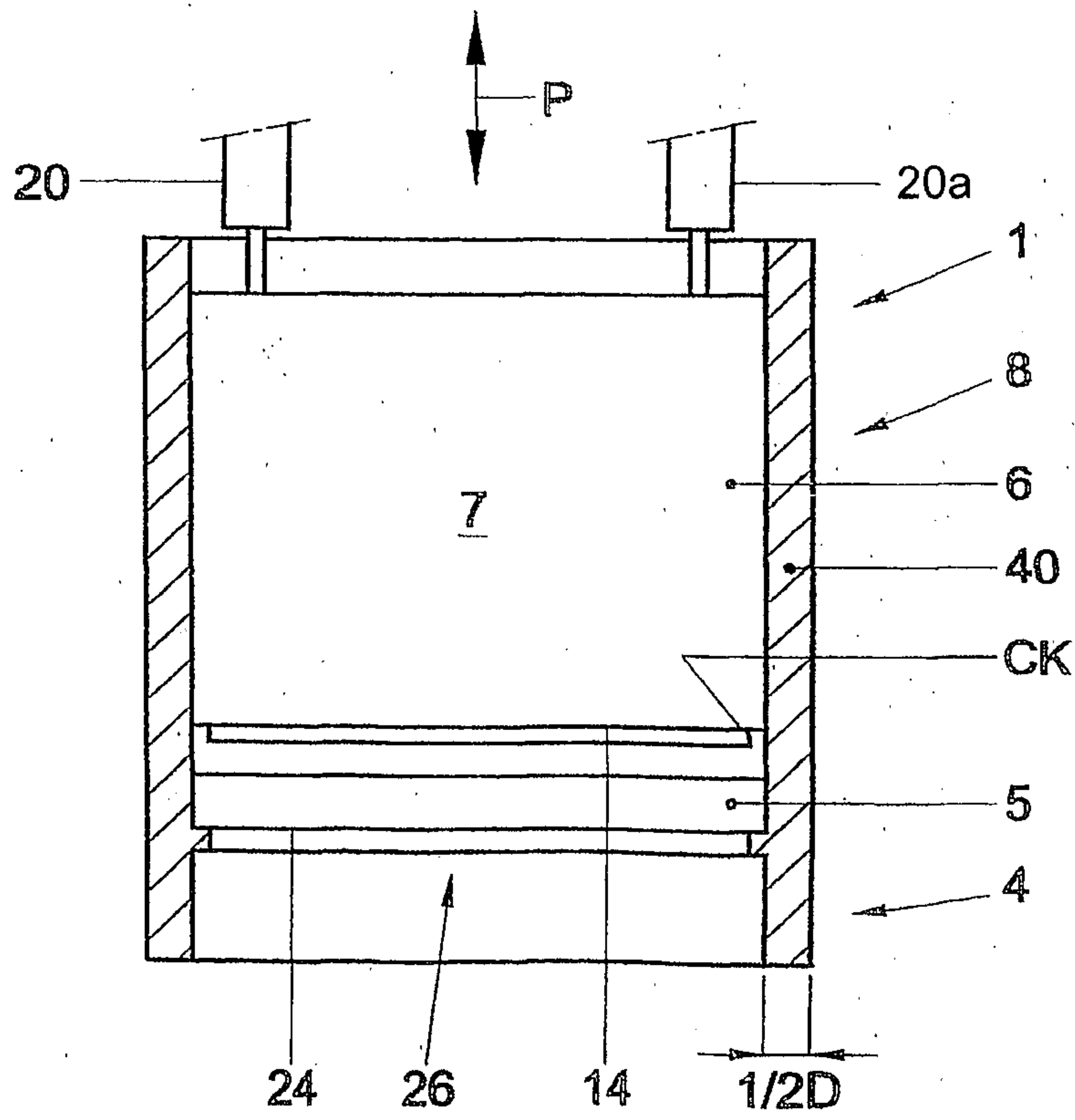


Fig. 5

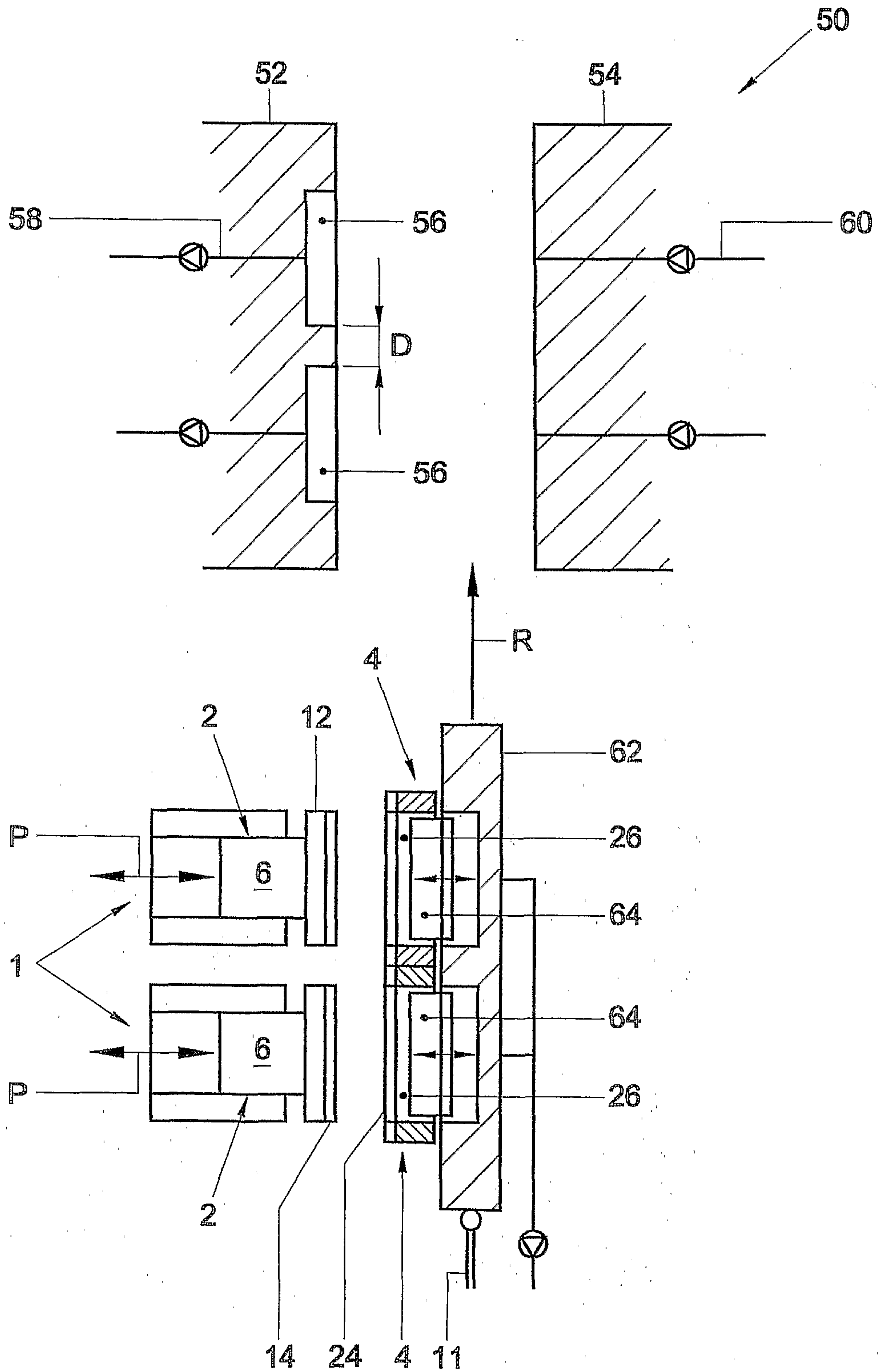


Fig. 4

