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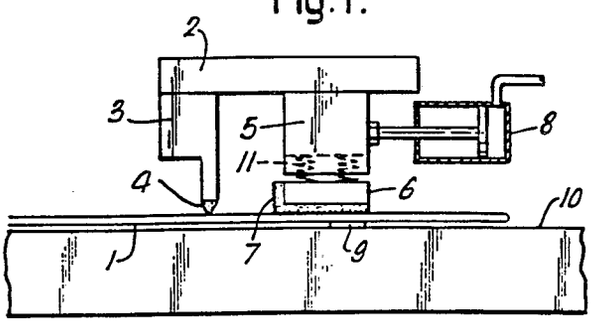
(54) Bag opening device.

(57) Apparatus for the opening of a bag (1) is provided with a clamp (2) having one fixed jaw (3) which applies a high pressure to a limited area of the bag by means of a pip (4), and a movable jaw (5) which applies a lower pressure to the bag (1) over a larger area through a spring-loaded block (6) and a rubber pad (7), and is movable by means of a pneumatic cylinder (8). The high pressure applied by the pip (4) is sufficient to prevent any relative movement of the bag panels. The lower pressure exerted by the rubber pad (7) is sufficient to prevent sliding movement of the pad (7) relative to the upper surface of the bag (1) but does not prevent relative movement between the upper and lower panels of the bag (1). When the movable jaw (5) is moved towards the fixed jaw (3) a region of the upper panel of the bag is buckled between the two jaws. Raising of the clamp thus opens the bag, the lower side being held down by adhesive tape (9).

Fig.1.



EP 0 309 112 A1

BAG OPENING DEVICE

This invention relates to a method of and apparatus for opening and holding open a bag while an operation is carried out such as insertion of the product which the bag is intended to contain.

Packaging bags have in the past been opened, on an automatic or semi-automatic bag loader, by inflation using an air jet blown from below the product feed surface. However, the act of introducing the product into the bag obstructs the jet temporarily and thus the bag is not always fully open to receive the product entering the bag mouth.

Previously it has been known from US-A-4516384 to open bags, that is to separate the bag walls at the bag mouth, by applying a rotatable rubber-faced wheel or roller to the top panel, rotating the rubber wheel causing the bag panels to separate either side of the rubber wheel, and inserting spreader bars which can then be used to open the bag. US-A-4516384 also discloses bag opening apparatus comprising a support frame carrying two resilient rubber fingers which, in the relaxed state extend downwardly convergently towards a bag, but do not contact each other. The frame is lowered so that the fingers touch the upper surface of the bag. As the support frame is lowered farther, the rubber fingers are bent towards each other, until, due to the frictional contact between the fingers and the bag, a buckle of bag material is gripped between them ready to receive one of two spreader bars. This, however, is unsatisfactory in that varying bag stiffnesses (e.g. resulting from a multi-function laminated bag such as a bag having an oxygen barrier layer and a bone guard layer), and other mechanical parameters of the bag make the apparatus inefficient and unreliable often causing both bag panels to be gripped together. Air inflation is also ineffective in such cases. The preambles of the independent claims to the present invention are based on this latter disclosure of US-A-4516384.

According to one aspect of the present invention there is provided apparatus for opening a bag comprising:- a clamp body and having relatively movable first and second jaws and means for driving the jaws to bring them closer to one another for pinching a bag wall to open it, characterised in that the first jaw is a fixed jaw and the second jaw is a movable jaw both carried by the clamp body, the movable jaw being yieldably mounted on the clamp body such that when the clamp body is lowered towards a bag the movable jaw is pressed against the bag with a constant force during descent of the clamp body so that the fixed jaw exerts a higher pressure on the bag than the constant force of the movable jaw; and in that the means for bringing the first and second jaws closer to one another comprise means for driving the movable jaw towards the fixed jaw whereupon a region of the upper panel of the bag is buckled between the two jaws and may be gripped by the clamp.

According to a second aspect of the invention there is provided a method of opening a bag comprising the steps of applying pressure to first and second regions of an upper panel of the bag and dragging at least one of the first and second regions towards the other thereby causing a region of the upper panel of the bag between the two parts to buckle, and pinching and lifting said buckled region to lift the upper panel of the bag, so opening the bag, characterised in that a higher pressure is applied to the first region of the upper panel of the bag and a substantially constant lower pressure is applied to the second region of the bag by yieldably pressing a clamp member thereagainst; and in that the first region of the bag where the substantially constant lower pressure is applied is dragged towards the second region where the higher pressure is applied.

The use of one stationary high pressure jaw permits that bag-engaging jaw to serve as a movement stop on any vertical movement of the clamp, thereby allowing a precise position of the movable jaw to be established relative to the bag and hence an accurate control of the bag/jaw friction at the movable jaw to be maintained in order to ensure sliding of the top panel relative to the lower panel of that bag.

In order that the present invention may more readily be understood the following description is given, merely by way of example, with reference to the accompanying drawings in which:-

FIGURE 1 is a side view of a bag-engaging clamp of the apparatus of the present invention;

FIGURE 2 is a side view of the clamp pinching an upper bag panel;

FIGURE 3 is a perspective view of the fixed jaw of the clamp;

FIGURE 4 is a top plan view of the apparatus;

FIGURE 5 is a front view showing the apparatus with the bag held open; and

FIGURE 6 is a sectional view of an alternative embodiment of bag-engaging clamp.

Figure 1 shows one of two vertically movable clamps 2 of bag-opening apparatus of the present invention having one fixed jaw 3 and a second movable jaw 5. The fixed jaw 3 contacts the top panel of the bag 1 over a small area in order to

maximise the pressure applied for a given downward force. Preferably the fixed jaw 3 is provided with a pip 4 in order that the contact area with the top panel is minimised. The movable jaw 5 is provided with a block 6 at the base of which is mounted a pad 7 of rubber or other high friction material which may preferably have a serrated or other profiled lower surface.

The base of the movable jaw 5 contacts the upper panel of the bag over a larger area than the pip 4 and would thus exert a lower pressure for said given downward force. Furthermore the block 6 is spring-loaded against the base 10 by two compresson springs 11 so as to reduce the downward force as compared with said given force, by virtue of yielding of the loading spring 11.

It will be appreciated that as the clamp 2 is driven down (by means not shown) against the top surface of the top bag, the pip 4 of the fixed jaw 3 starts to compress the bags with a down force which increases relatively rapidly given the small vertical movement occurring. During this small movement the yielding of the loading springs 11 keeps the clamping force of the movable jaw 5 on the top bag at a substantially constant, much lower value.

The movable jaw 5 is movable laterally, towards and away from the fixed jaw 3, by means of a pneumatic cylinder 8 for a purpose to be described below.

The bag 1 may be one of a plurality of bags formed of a taped imbricated bag chain or alternatively the top bag of a stack of wicketed bags, or the leading bag of a chain of side-sealed bags. In the latter case there may be a single clamp 2 which may additionally move horizontally along the direction of bag chain advance to index the chain as the leading bag is opened.

The bag 1 rests on a base 10. In order to grip the upper panel of the bag 1 the clamp 2 is lowered onto the bag 1 so that the pip 4 located on the fixed jaw 3 and the high friction rubber base 7 of the movable jaw 5 both press onto the bag. The high pressure applied by the pip 4 is sufficient to prevent movement of the two bag panels relative to each other or relative to the base 10. In any case the friction between the lower bag panel and the base, and also the tension in the tapes 9, serve to hold the bottom panel flat. The substantially constant lower pressure exerted by the movable jaw 5 prevents relative movement between the rubber base 7 and the upper bag panel, but does allow for relative movement between the two bag panels of the top bag. Thus when the movable jaw 5 is moved towards the fixed jaw 3 by operation of the ram 8, a region of the upper bag panel buckles upwardly between the two. This buckle is then pinched between the fixed jaw 3 and the movable jaw 5, as shown in Figure 2. Preferably, the base 10 is made of hard rubber in order that the bag bending effect at the pressure point of pip 4 is enhanced.

The achievement of a reduced contact area at the fixed jaw 3 may be by way of the pip 4, or by any other means such as a "line contact" knife edge on the jaw undersurface.

A complete bag opening operation using the apparatus of Figures 1 to 5 will now be described with reference to the drawings.

The two clamps 2 of the apparatus are lowered onto the upper surface of the bag 1 near its mouth, preferably each positioned just within the tapes 9 as shown in Figure 4. The degree of down-thrust is adapted to the holding force required of the fixed jaw 3, while the much lower down-thrust of the movable jaw 5 is constant.

Each clamp 2 then executes the pinching operation described above, by operation of its ram 8, in order each to pinch a buckle of the upper panel of the bag 1.

The clamps 2 are then subsequently raised in order to open the bag. The lower panel of the bag 1 is held down onto the base 10 by means of the adhesive tapes 9. The opened bag is shown in Figure 5. The product which the bag is intended to contain can then easily be inserted through the opening formed. Thus the invention allows for products such as foodstuffs to be readily packaged in bags for example by an operator-free automatic bag loader.

Although in the drawings and in the above description two clamps 2 are provided, and operated in unison, it is possible for only one clamp 2 to be used, or for more than two clamps to be provided. Where more than two are used there may be clamping of the bag both at or near the mouth and at one or more location between that clamping and the closed end of the bag. This could even be achieved by having a virtually continuous line of clamping along the bag or several such continuous lines laterally spaced on the bag. This is particularly useful for bags to contain fatty or boney products.

The alternative embodiment shown in Figure 6 has many features in common with that of the earlier drawings and consequently the same reference numerals are used for those corresponding parts.

The notable difference between the embodiment of Figure 6 and that of the earlier drawings resides in the use of a spherical bush 12 surrounding a stud 13 which supports the helical compression spring 11, and is rotatable within a spherical bearing 14 carried by the movable jaw body 5. Thus the block 6 of the movable jaw member is swivellable relative to the jaw member 5 itself and

consequently can self-align in the event of any irregularity in the bags against which it is lowered.

The entire clamp 2 is carried by a carriage 15 which is slidable axially along a vertically movable horizontal slide 17, extending parallel to a direction of bag advance, by means of two driving rods 18 to which the carriage 15 is clamped by screws 19. Apart from the use of a swivellable single stud 13 and spring 11, and apart from the horizontal movement of the clamp body 15, in all other respects, the apparatus of figure 6 operates identically to that of figures 1 to 5.

From the above description, it is clear that the present invention shows a definite improvement over the prior art, using the much lower constant pressure applied by a movable jaw to ensure that only the upper panel of a bag is gripped.

Claims

1. Apparatus for opening a bag comprising:- a clamp body and having relatively movable first and second jaws (4, 6) and means (8) for driving the jaws to bring them closer to one another for pinching a bag wall to open it, characterised in that the first jaw is a fixed jaw (4) and the second jaw is a movable jaw (6) both carried by the clamp body (2), the movable jaw being yieldably mounted on the clamp body such that when the clamp body is lowered towards a bag the movable jaw (6) is pressed against the bag with a constant force during descent of the clamp body (2) so that the fixed jaw (4) exerts a higher pressure on the bag than the constant force of the movable jaw; and in that the means for bringing the first and second jaws closer to one another comprise means (8) for driving the movable jaw (6) towards the fixed jaw (4) whereupon a region of the upper panel of the bag is buckled between the two jaws and may be gripped by the clamp.

2. Apparatus according to claim 1 characterised in that the fixed jaw is provided on its underside with a bag-contacting area (4) which is reduced relative to that (6) of the movable jaw.

3. Apparatus according to claim 2, characterised in that the reduced bag-contacting area is defined by a pip.

4. Apparatus according to claim 2, characterised in that the reduced bag-contacting area is defined by a knife edge.

5. Apparatus according to any preceding claim, characterised in that the movable jaw applies pressure yieldably to the bag by means of a block (6) having a pad (7) of high friction material and biased relative to the clamp body (2) by means of a compression spring (11).

6. Apparatus according to claim 5, characterised in that the high friction pad (7) has a profiled bag-engaging surface.

7. Apparatus according to either of claims 5 and 6, characterised in that the movable block (6) is swivellable relative to the clamp body to allow it to self-align with the top surface of a bag to be opened.

8. Apparatus according to any preceding claim characterised by including a base (10) made of hard rubber on which the bag may rest.

9. Apparatus according to any one of the preceding claims, characterised in that there are two of said clamps spaced apart and operable to lift the upper bag panel to form a rectangular opening at the bag mouth.

10. A method of opening a bag comprising the steps of applying pressure to first and second regions of an upper panel of the bag and dragging at least one of the first and second regions towards the other thereby causing a region of the upper panel of the bag between the two parts to buckle, and pinching and lifting said buckled region to lift the upper panel of the bag, so opening the bag, characterised in that a higher pressure is applied to the first region of the upper panel of the bag and a substantially constant lower pressure is applied to the second region of the bag by yieldably pressing a clamp member thereagainst; and in that the first region of the bag where the substantially constant lower pressure is applied is dragged towards the second region where the higher pressure is applied.

Fig.1.

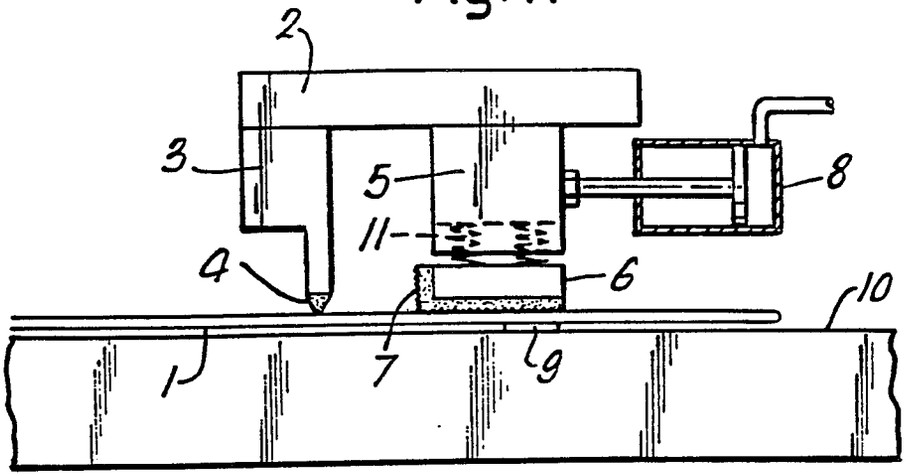


Fig.2.

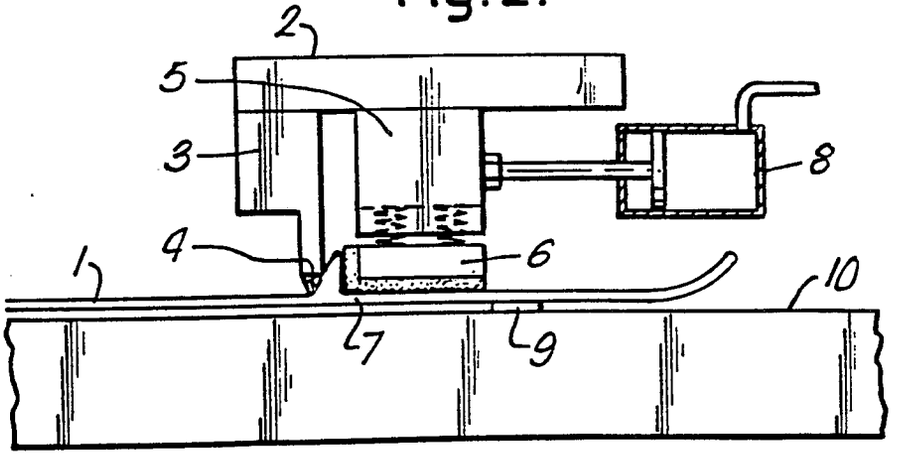


Fig.3.

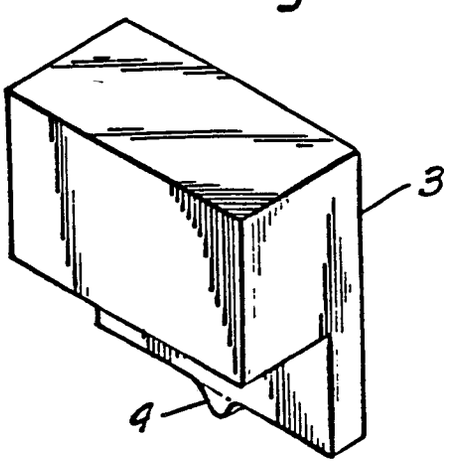


Fig.4.

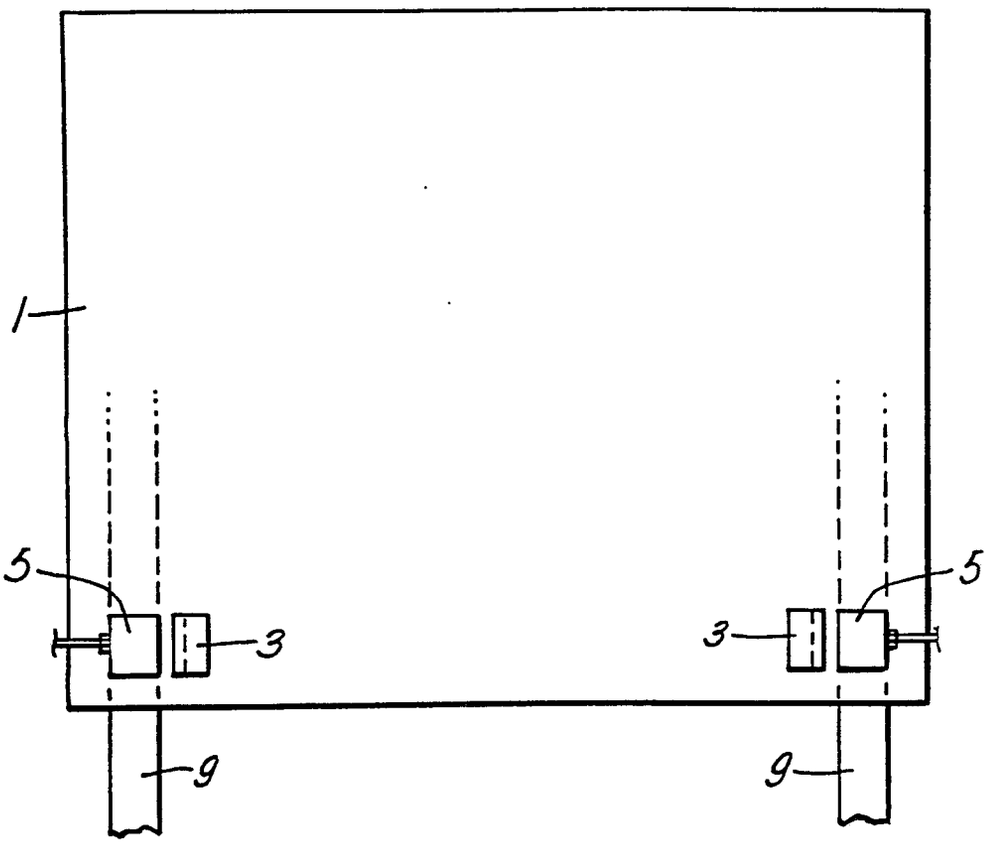


Fig.5.

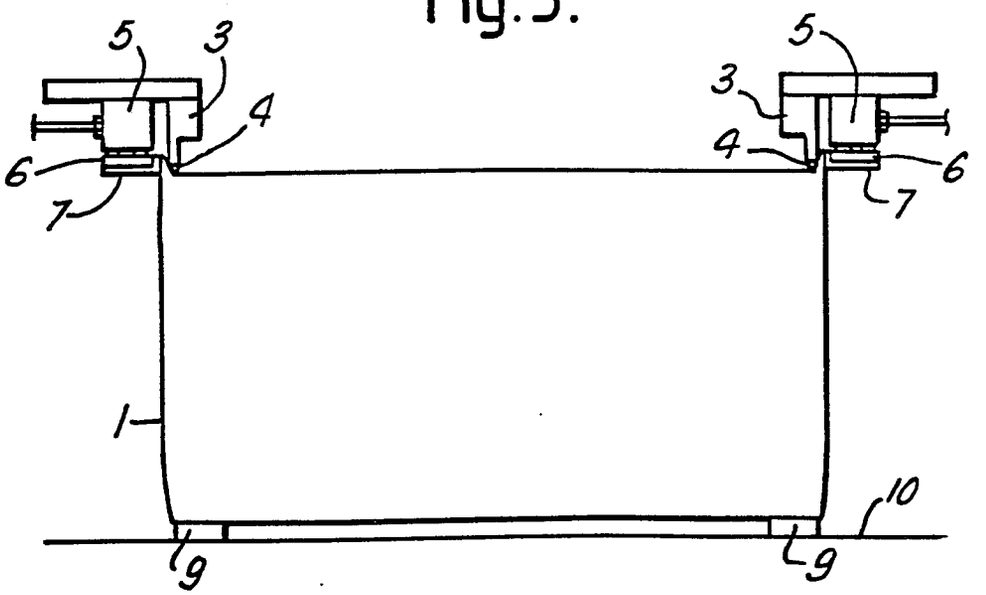
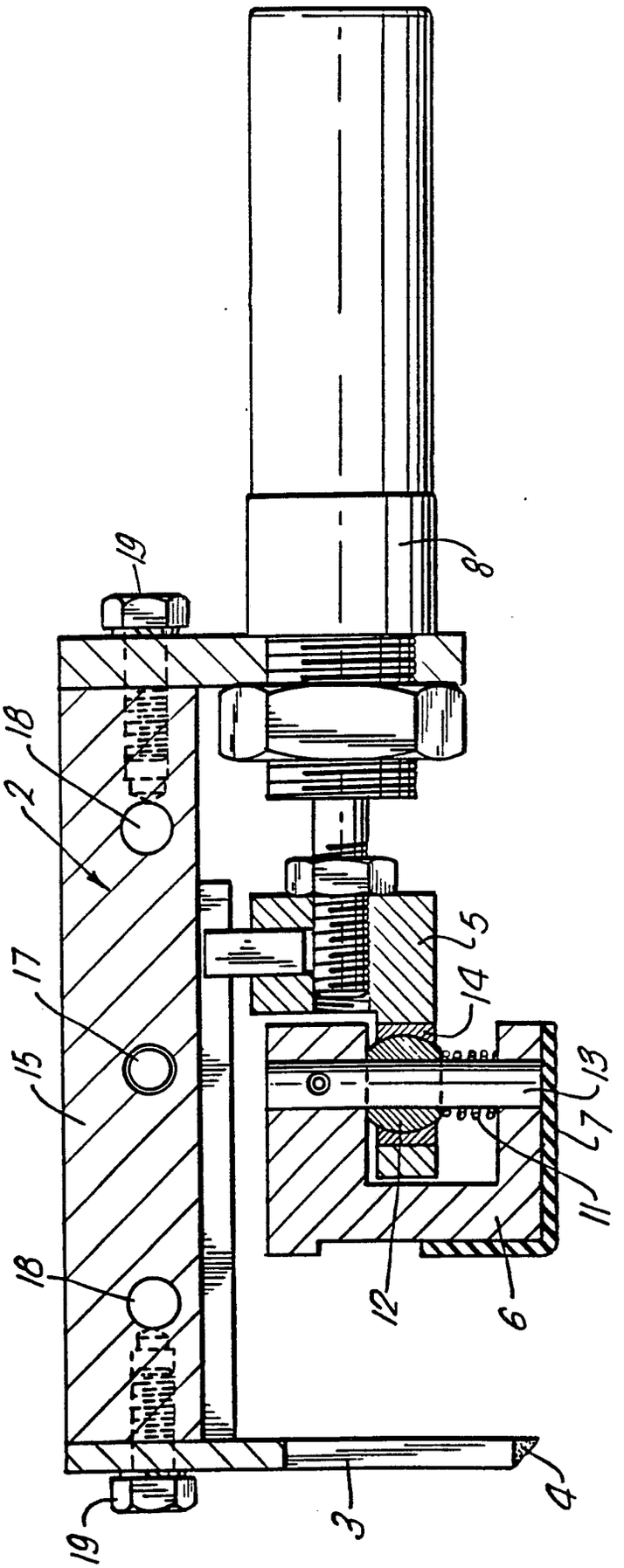


Fig.6.



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 30 8204

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.4)
X	DE-A-3 326 616 (TOSS) * Whole document *	1,6,10	B 65 B 43/26
A		5,9	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 65 B
B 31 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23-12-1988	CLAEYS H.C.M.

CATEGORY OF CITED DOCUMENTS

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