

AMENDED

P/00/001



Commonwealth of Australia

Patents Act 1990

SPRUSON & FERGUSON

650582

**PATENT REQUEST: STANDARD PATENT**

We, the Applicants/Nominated Persons specified below, request we be granted a patent for the invention disclosed in the accompanying standard complete specification.

**[70,71] Applicants/Nominated Persons:**

Tetra Laval Holdings & Finance S.A., of Avenue General-Guisan 70,  
CH-1009 Pully, Switzerland

**[54] Invention Title:**

An Apparatus for Welding the Sealing Seam on a Package

**[72] Inventor(s):**

Thomas Riedel

**[74] Address for Service in Australia:**

Spruson & Ferguson, Patent Attorneys  
Level 33 St Martins Tower  
31 Market Street  
Sydney New South Wales Australia [Code SF]

[31]	Application No	Basic Convention Application Details		[32] Date of Application
		[33] Country		
	P41 40 037.2	DE		5 December 1991

DATED this TWENTY-SECOND day of DECEMBER 1993  
Tetra Laval Holdings & Finance S.A.

Registered Patent Attorney

IRN: 223430

INSTR CODE: 64070

P/00/008

Australia

DA-005

SPRUSON & FERGUSON

Patents Act 1990

NOTICE OF ENTITLEMENT

I, Gösta Sevrell  
of Tetra Alfa Holdings S.A. 70, Avenue General-Guisan  
1, \_\_\_\_\_, of \_\_\_\_\_

CH-1009 Pully, Switzerland

being the Applicant/Nominated Person in respect of Application No 28253/92  
state the following:-

The Applicant/Nominated Person has entitlement from the actual inventor(s) as  
follows:-

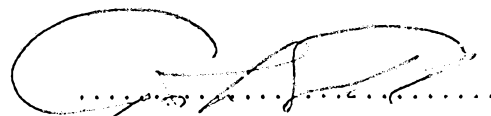
The Applicant/Nominated Person is the assignee of Tetra Pak GmbH which  
is the assignee of the actual inventor.

The Applicant/Nominated Person is entitled to rely on the basic application(s)  
listed on the Patent Request as follows:

The Applicant/Nominated Person is the assignee of Tetra Pak GmbH which  
is the assignee of the actual inventor.

The basic application(s) listed on the Patent Request is/are the  
application(s) first made in a Convention country in respect of the invention.

DATED this Lund 25 day of February 19 93

  
(Signature)

Gösta Sevrell - Managing Director  
.....  
(Name & Title)

IRN: 223430

INSTR CODE: 64070

JED/2215T



AU9228253

(12) PATENT ABRIDGMENT (11) Document No. AU-B-28253/92  
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 650582

- (54) Title  
AN APPARATUS FOR WELDING THE SEALING SEAM ON A PACKAGE
- International Patent Classification(s)  
(51)<sup>5</sup> B65B 009/02
- (21) Application No. : 28253/92 (22) Application Date : 10.11.92
- (30) Priority Data
- |             |           |              |
|-------------|-----------|--------------|
| (31) Number | (32) Date | (33) Country |
| 4140037     | 05.12.91  | DE GERMANY   |
- (43) Publication Date : 10.06.93
- (44) Publication Date of Accepted Application : 23.06.94
- (71) Applicant(s)  
TETRA LAVAL HOLDINGS & FINANCE S.A.
- (72) Inventor(s)  
THOMAS RIEDEL
- (74) Attorney or Agent  
SPRUSON & FERGUSON, GPO Box 3898, SYDNEY NSW 2001
- (56) Prior Art Documents  
US 5094657  
US 5034087  
US 4479834
- (57) Claim

1. An apparatus for welding the sealing seam on a package consisting at least partially of synthetic plastics coated paper, with a welding tool comprising dies and counter dies, a support, and a drive means for generating the pressure force, characterised in that two welding dies are mounted on in each case an outer hollow shaft adapted to rotate on a common axis, each outer hollow shaft being rotationally rigidly connected to a common torsion spring serving as part of the drive means, the torsion spring being driven from outside.

AUSTRALIA  
PATENTS ACT 1990

650582

COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL



Name and Address  
of Applicant:

*Tetra Laval Holdings & Finance S.A.*

~~Tetra Alfa Holdings S.A.~~  
Avenue General-Guisan 70  
CH-1009 Pully  
SWITZERLAND

Actual Inventor(s): Thomas Riedel

Address for Service: Spruson & Ferguson, Patent Attorneys  
Level 33 St Martins Tower, 31 Market Street  
Sydney, New South Wales, 2000, Australia

Invention Title: An Apparatus for Welding the Sealing Seam on a Package

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

-----  
An apparatus for welding the sealing  
seam on a package  
-----

5 The invention relates to an apparatus for welding the sealing seam on a package which consists at least partially of synthetic plastics coated paper, comprising a welding tool having dies and counter-dies, a support and a drive means to generate the pressure force.

10 In prior art packaging machines, liquids packages are produced in large quantities per unit of time in that from a strip of synthetic plastics coated paper or cardboard a sleeve or a sleeve with a bottom is formed, closed at one end and then transported to the filling station. In the case of these prior art machines, the package which is ready to be filled stands upside down and empty, i.e. the  
15 cover which possibly incorporates the pouring device constitutes the surface on which the package is standing, while what will subsequently be the bottom of the package is at the top and is open. It is through this that the package is filled, for example with milk or juice. In the

prior art machine, the filled package is conveyed from the filling station to a bottom folding station where the bottom wall panels are so placed together by means of shaping dies, sheets and the like that a double layer  
5 cardboard strip is produced in which a transverse sealing seam has to be made. Once this is made, then a package containing flowable media is also fluid-tight and can be carried away.

It is particularly at the making of this sealing seam that  
10 the invention is directed and an apparatus is proposed with which welds can be undertaken generally by means of dies and counter-dies.

To a man skilled in the art of packaging machines, it is known that sealing-tightness on the one hand and economi-  
15 cally favourable production of sealing seams on the other is a critical point which is frequently open to improvement where the production machinery is concerned. In the case of prior art packaging machines, dies and counter-dies are moved by pneumatic or hydraulic cylinders  
20 and are so pressed together that the necessary welding force is created. Where foodstuffs have to be packaged, then hygiene is a particularly important factor which is often counteracted by lubricants. Without these, parts of the machinery which are particularly stressed suffer from  
25 wear and tear. Hydraulic systems cannot be operated unless hydraulic fluid is used and in the event of a leak the required level of hygiene is jeopardised.

Another wish which the package producer cherishes is the improvement in the economy and better utilisation of  
30 space. Producers require a particularly compact and efficient machine.

The output from a welding station of the type in question here can be doubled by making two transverse sealing seams simultaneously at the welding station. By this means, economy will be greatly improved but the machine manufacturer is also required to design so that less space is occupied and naturally the peripheral conditions already existing with previously known machines must be maintained, such as for example a guarantee of the necessary hygiene. With pneumatic and hydraulic systems, it is difficult to maintain this last-mentioned requirement and with plate spring systems it is hardly possible for two adjacently disposed welding tools to be kept properly functioning at virtually the same working pressures and high speed.

The invention is therefore based on the problem of so developing the welding apparatus mentioned at the outset that two welding tools can be simultaneously used and operated while substantially the same pressure forces are available at both working stations.

According to the invention, this problem is resolved in that two welding dies are mounted about a common axis on respective outer hollow shafts, each outer hollow shaft being rotationally rigidly connected to a common torsion spring as part of the drive means, the torsion spring being driven from outside. According to the invention, therefore, there is a departure from the prior art technique of the pneumatic or hydraulic systems and a mechanical drive is chosen which uses a torsion spring in order to press two welding dies onto counter-dies with virtually the same amount of force. In the case of the mechanical solution chosen according to the invention, no hygiene problems can arise by reason of flow media such as

gases, air, oil, and the output from the filling station is nevertheless doubled in that two welding dies are rotated about a common axis and therefore pressure can be applied to them in such a way that they carry out the weld  
5 in the short time desired, and at approximately the same pressure. The finished product, for example the flowable medium package which has a sealing seam, demonstrates regularly reliable sealing-tightness in random tests and also in long-term tests.

- 10 It is particularly expedient if according to the invention both outer hollow shafts are disposed axially one behind another and are mounted both by two outer bearings and also by a common middle bearing, when the torsion spring extends in one piece over the total length from one  
15 bearing to the other and when the middle bearing is disposed axially between the two welding dies. This construction permits of symmetrical initiation of forces and also, on the output side, ensures good symmetry because each hollow shaft is supported at one end in its  
20 outer bearing and at the other in the common middle bearing, and both hollow shafts are driven at comparable locations and also divert the force, namely to the welding tools so producing the desired even distribution of pressure.

- 25 According to the invention, it is particularly advantageous if the rotationally rigid connections between torsion spring and each of the two outer hollow shafts are disposed in the region of the outer bearings. The distance between the common middle bearing and the two  
30 outer bearings may be substantially the same, so achieving symmetry in the whole arrangement. If the rotationally rigid connections are disposed in the region of the outer



bearings, then the initiation of force can obviously be made at locations which are symmetrical with the middle bearing. A rotationally rigid connection can be made by a polygonal shaft, a splined shaft or even adjusting  
5 springs, as the man skilled in the art himself can select and decide upon from a multiplicity of available types of connection.

If the output from the torsion spring to the outer hollow shaft occurs in the region of the outer bearings, then  
10 according to the invention it is particularly expedient for the initiation of force to occur at the same distance from the two outer bearings, in other words substantially in the middle region. In other words, according to the invention, the torsion bar is driven in the region of its  
15 axial centre.

Expediently, the invention is further developed in that the drive of the torsion spring is constituted by a rotationally rigid connection of the spring to an inner hollow shaft which, engaging around the torsion spring,  
20 extends inside the outer hollow shaft substantially over its length and into the region of the outer bearing where it is provided with a radial drive part which emerges outwardly through the outer hollow shaft. There are two advantages which are surprisingly obvious in connection  
25 with this design. Firstly, the drive can be brought in from outside anywhere on the hollow shaft structure, in other words there where walls, machine supports and the like are available, where drives can readily be applied and can be transferred to other elements. Nevertheless,  
30 the above-mentioned symmetry of force guidance is guaranteed because the force introduced from the outer drive unit, for example a torque, is conducted through the

inner hollow shaft into the region of the axial centre of the torsion spring. Secondly, from the disposition of the inner hollow shaft in the outer hollow shaft and due to the further disposition of the torsion spring which  
5 - situated in the common axis mentioned at the outset - extends through both outer hollow shafts, a man skilled in the art will recognise an encapsulated construction. Therefore, the torsion spring is situated centrally as a spring element and kept away from environmental conditions  
10 by reason of its encapsulation by the hollow shafts. This central position permits of a very hygienic solution because outer articulations, cylinders and springs in the hygiene area are advantageously avoided.

It is furthermore advantageous according to the invention  
15 if the torsion spring has a flat characteristic curve in that a considerable variation in the shape of the torsion spring produces relatively small variation in force. The most widely diverse torsion springs are available on the market. With a correct choice of spring diameter, the  
20 desired length of twist and the above-described construction can achieve an accurate sub-division of the initiated force over two force components which are derived at different locations.

Before the welding tools bear on the counter-die or on the  
25 cardboard strips subsequently disposed between the dies, the application of a rotary force produces a corresponding rotation of the front surface of the welding tool. Once the relevant welding tool has approached and has started to bear on the counter-die or on the cardboard strip  
30 disposed between the dies, the torsion spring is by further actuation of the drive and via the drive lever emerging outwardly through the outer hollow shaft rotated

outwardly at both ends by further rotation of the inner hollow shaft and is thus pretensioned. This pretensioning force which results from torque and radius of action, presses the welding tools onto the mating side.

- 5 The flat characteristic curve of the torsion spring yields a relatively low force to be tapped, with a relatively large deformation or considerable variation in the angle of rotation, where the drive is initiated into the outer drive unit. Noteworthy is the small installation space in  
10 which this force conduct and distribution of the force is made possible in this narrow field of tolerance.

- In practice, when a packaging machine is installed which has two axially serially disposed welding tools, it happens time and again that the front face of one tool  
15 projects by 1 or 2 mm beyond the front face of the other tool. In this case, the aforesaid flat characteristic curve according to the invention has the advantage that despite this path difference the initiation of the central force is evenly distributed over both welding tools so  
20 that both welding dies are pressed onto the oppositely disposed surface with almost the same force. The flat characteristic curve even provides the advantage that from the drive side, the effect of errors has virtually no influence in the welding area. This is importance because  
25 during the course of prolonged operation abrasion phenomena can easily occur on the drive side, i.e. bushes may fail. Such faults due to wear and tear have virtually no effect in terms of changing the force which finally provides the welding pressure between the dies. In  
30 conjunction with the above-mentioned distribution of the force flow from the middle outwards the flat characteristic curve provides for further evening-out of

the force distribution at the ends, where the forces are derived. Often a variation in force or even a deviation in force between one and other of the two welding tools of just 10% is acceptable. This tolerance can be readily  
5 achieved as a result of the construction according to the invention. Tests have shown that in spite of the manufacturing tolerance of the torsion spring, a force error tolerance of a maximum of just 3% can be achieved. These measures are also valid for welding forces of about  
10 1300 Newtons per welding side.

With the construction according to the invention, it is in particular possible to achieve the pressure during welding by an over-turn of the torsion spring. For example, when the front of the particular welding tool being used has  
15 just come in contact with the workpiece, then by further rotation of the inner hollow shaft through 10° for instance angle of rotation, an over-stroke is achieved and with it a pressure force between the two welding dies.

For exact movement, it is expedient for relatively large  
20 welding tools to be mounted by means of two spaced apart supports, e.g. by means of the aforescribed arrangement at one end where, at the point at which the force is derived, the force is transferred to the welding dies only by a connecting bolt or such like, and at the other via a  
25 guide lever which guarantees very satisfactory parallelism during movement of the welding tool.

In contrast to conventional hydraulic systems in which, in the application according to the invention, susceptibility to breakdowns would be observed, the mechanical principle  
30 of the torsion spring which is used here means that no complicated servo-proportional technology has to be used.

In contrast to the imprecisely operating pneumatic systems, the system according to the invention is extremely accurate and rapid with the torsion spring. There is no consumption of oil or air and there is no need  
5 to watch out for leaks as with hydraulic or pneumatic systems and also abrasion and the complicated encapsulation involved with plate spring systems can advantageously be dispensed with according to the invention. It will be understood that the use of the above-described apparatus  
10 for ultrasonic welding and/or pulsed current arc welding and/or inductive welding is particularly favourable. For all these systems, the application of force in accordance with the invention can be very interesting and be relied upon to provide the advantages mentioned.

15 Therefore, it is quite particularly interesting if in accordance with the invention the apparatus is used for welding the double-layered cardboard strip in the transverse sealing seam of a liquids package.

Further advantages, features and possible applications of  
20 the present invention will emerge from the ensuing description of a preferred example of embodiment in conjunction with the accompanying drawings, in which:

Fig.1 is a view taken on the line I-I in Fig. 2, two welding tools and two packages which are to be  
25 welded being shown while the drive means is shown in section;

Fig.2 is a side view of the drive means, the support and a welding tool, and

Fig.3 is a plan view of Fig. 2 in which however the drive  
30 means is partially shown in section.

The drive means generally designated 1 consists essentially of a torsion spring 3 of high-strength steel rotatable about a common axis 2 and which is mounted substantially in the middle of its length L in a middle bearing 4 and at the ends in a left-hand outer bearing 5, for example a needle bearing 5" disposed in a rigid support 5', and a right-hand outer bearing 6, e.g. a rolling-type bearing 6" disposed in a rigid bearing bush 6'. This mounting is achieved via hollow shafts employing the construction described in greater detail hereinafter.

In the fixed middle bearing bush 4' of the middle bearing 4, ball bearings 4" support a left-hand outer hollow shaft 7 which extends leftwardly from the middle bearing 4 to the outer bearing 5 and which is coaxial with the central axis 2 and the torsion spring 3 and supported on the outer left-hand side by the described needle bearing 5" in the left-hand outer bearing 5. The middle ball bearing 4" of the middle bearing 4 supports a rightwardly extending inner hollow shaft 8 which is supported at its right-hand outer end in rolling bearings 6"" in respect of a right-hand outer hollow shaft 9. This latter in turn is mounted in the right-hand outer bearing 6 through the aforementioned roller bearing 6" and in the middle portion via the right-hand ball bearing 4" in the middle bearing 4.

The torsion spring 3 is rotationally rigidly connected to the hollow shafts. From the drive side which is in the region of the right-hand outer bearing 6, the driving force  $F_{ges}$  is initiated in the direction of the arrow 10 via a drive arbor 11 by means of which a moment is applied to the right-hand inner hollow shaft 8 via a lever 12, because this lever 12 is connected to the hollow shaft 8 in the region of the right-hand outer bearing 6. In this

way, therefore, the driving rotation of the right-hand inner hollow shaft 8 becomes possible. Its output side is on the left in the region of the middle bearing 4. There is shown the first rotationally rigidly connection 3 which  
5 takes the form of a polygon. The middle portion of the torsion bar 3 is of correspondingly polygonal form because this first rotationally rigid connection 13 is situated at about half the length L of the torsion bar 3 in the region of the right-hand ball bearing 4" of the middle bearing 4.

10 It is at this rotationally rigid connection 13 that the rotary force is transmitted from the right-hand inner hollow shaft 8 to the torsion bar 3 which is therefore driven in its centre and passes the force on to its outer ends. A torsion spring effect is created in the right and

15 left-hand halves of the torsion bar 3. The left-hand half of the torsion bar 3 extends through the outer left-hand hollow shaft 7 and is operatively engaged therewith via the second rotationally rigid connection 14. The left-hand outer end of the left-hand outer hollow shaft 7 which  
20 is supported in the left-hand outer bearing 5 therefore receives the driving force via this second rotationally rigid connection 14 and conducts it rightwardly to a clamping connection 15 at which the welding tool is provided, as will be described hereinafter.

25 In the middle bearing 4, via the first rotationally rigid connection 13 between the right-hand inner hollow shaft 8 and the torsion bar 3, the force in its right-hand half is guided rightwardly into the region of the right-hand outer bearing 6, actually even beyond it because the torsion  
30 spring 3 has at its right-hand end the third rotationally rigid connection 16 via which the rotary force is transferred to a coupling plate 17. This coupling plate 17 is mounted on the right-hand outer hollow shaft 9 by means of

screws 18 so that via this coupling plate 17 the driving force is passed to the right-hand outer hollow shaft 9. In this latter, the force is finally guided in an axial direction into the vicinity of the middle bearing 4, 5 namely into the clamping connection 15a which is constructed similarly to the clamping connection 15.

At the ends of the torsion spring 3, caps close off in respect of the outside ambient the support 5' and/or coupling plate 17 and the encapsulated arrangement of the 10 torsion spring 3. This encapsulated construction of the drive means 1 can clearly be seen.

The force 10 initiated at the drive arbor 2 therefore arrives via the aforescribed force flow paths and reaches the clamping connections 15 and 15a whence it is 15 initiated via levers 20, 20a into the arbors 21, 21a in order thence to conduct the welding force  $F$ ,  $F_2$  into the welding tools 25 and 25a shown in Figs. 2 and 3.

The intention is to weld the sealing seam 23 shown at the bottom centre of Fig. 1 and which is part of a fluids 20 package 24 of which the tube formed from synthetic plastics coated paper is shown by broken lines, with the bottom already partially formed into the transverse sealing seam 23.

As a welding tool for welding the seam 23, in the parti- 25 cularly preferred instance shown here, the ultrasonic welding is performed by a sonotrode 25. Fig. 3 shows a plan view of the view in Fig. 1, the equivalent and symmetrical disposition and suspension of the welding tools 25 being evident. Since both welding tools are of 30 identical construction, it is sufficient to describe just



one of these tools. The support 26 of the welding tool 25 is effected via the aforementioned arbors 21 and 21a via which the force initiated from the lever 20, 20a is conducted to the welding tool 25, 26.

5 For a precise parallelogram movement, a guide lever 27 is furthermore mounted on the holder 26 for the welding tool farther forward towards the tip 28 of the welding tool. The guide lever 27 can be pivoted in an arc about the axis 29.

10 The flat characteristic curve of the torsion spring 3 should be explained by stating that in the cartesian system of co-ordinates, the angle of rotation of the torsion spring 3 should be imagined as being on the horizontal axis while the ordinate, at right-angles thereto, must be imagined as representing the force applied to the welding tool 3 via the arbors 21 and 21a in accordance with the arrows F and Fa in Fig. 1. The spring characteristic curve is flat when large values of angle of rotation correspond to relatively small values of force.

20 The exact inclination of a straight line passing through the origin of the cartesian system of co-ordinates on the one hand and the point of rotational angle/force measurement on the other will be forthcoming according to the dimensions and material of the torsion spring.

25 By a juxtaposition of two welding tools 25 and 25a via the clamping connections 15, 15a, i.e. in other words one after the other in the axial direction of the torsion spring 3, it is possible to construct a compact sealing station which requires little space for power  
30 transmission. Consequently, also rapid operation can be guaranteed. In the case of a preferred and specific

embodiment, in a short time of just 400 ms the sealing dies have been moved together and the welding pressure applied. In the case of this embodiment, folding, bringing of the welding tools together, applying the  
5 welding pressure, the welding itself, the subsequent cooling and the moving of the welding tools apart occurred within just 940 ms. Of this, the cooling time alone represented 100 ms. This rapid and accurate operation is possible in a small space and in a very hygienic manner,  
10 because according to the above-described construction. the arrangement is encapsulated. The effective life of the torsion spring can be further increased if a preservative, such as for example grease, is introduced into the space around the torsion spring 3 and if this torsion spring is  
15 not exposed to either a cleaning agent or any product from the welding station of the machine.

By the choice of the spring characteristic curve described and by the construction and disposition of the torsion spring, it is possible when using two welding tools, to  
20 achieve a very satisfactory parallelism which in the case of the specific embodiment measured, achieved a divergence of only a few hundredths of a millimetre.

The claims defining the invention are as follows:

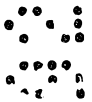
1. An apparatus for welding the sealing seam on a package consisting at least partially of synthetic plastics coated paper, with a welding tool comprising dies and counter dies, a support, and a drive means for generating the pressure force, characterised in that two welding dies are mounted on in each case an outer hollow shaft adapted to rotate on a common axis, each outer hollow shaft being rotationally rigidly connected to a common torsion spring serving as part of the drive means, the torsion spring being driven from outside.
2. An apparatus according to claim 1, characterised in that both outer hollow shafts are serially disposed in the axial direction and are mounted both by two outer bearings and also both are mounted by a common middle bearing, and in that the torsion spring extends in one piece over the total length from one outer bearing to the other and in that the middle bearing is disposed axially between the two welding jaws.
3. An apparatus according to claim 1 or 2, characterised in that the rotationally rigid connections between torsion spring and each of the two outer hollow shafts are disposed in the region of the outer bearings.
4. An apparatus according to one of claims 1 to 3, characterised in that the torsion spring is driven in the region of its axial centre.
5. An apparatus according to one of claims 1 to 4, characterised in that the drive of the torsion spring is constituted by a rotationally rigid connection between it and an inner hollow shaft which, engaging around the torsion spring, extends inside the outer hollow shaft substantially over its length and as far as the region of the outer bearing where it is provided with a drive part emerging radially outwardly through the outer hollow shaft.
6. An apparatus according to one of claims 1 to 5, characterised in that the torsion spring has a flat characteristic curve in that for a considerable variation in the shape of the torsion spring only a relatively small change in its force is achieved.
7. Use of the apparatus according to one of claims 1 to 6 for ultrasonic, pulsed current arc welding and/or inductive welding.

8. Use according to claim 7 for welding the double-layered cardboard strip in the transverse sealing seam of a liquids package.

DATED this TENTH day of NOVEMBER 1992

Tetra Laval Holdings & Finance S.A.  
~~Tetra Alfa Holdings S.A.~~

Patent Attorneys for the Applicant  
SPRUSON & FERGUSON



# Abstract

## An apparatus for welding the sealing seam on a package

---

An apparatus is described for welding the sealing seam  
5 (23) on a package (24) and which consists at least partially of synthetic plastics coated paper, with a welding tool comprising dies (25, 28) and counter-dies, a support and a drive means (1) for generating the pressure force.

10 So that two welding tools (25, 25a) can be used and operated simultaneously and so that substantially the same pressure forces are available at both working stations, it is according to the invention envisaged that two welding dies be mounted on respective outer hollow shafts (7, 9)  
15 in such a way as to be rotatable about a common axis (2), each outer hollow shaft (7, 9) being rotationally rigidly connected to a common torsion spring (3) as part of the drive means (1) (at 14, 16, 17), the torsion spring (3) being driven from outside (at 11, 12).

Figure 1

10 11 92

20253

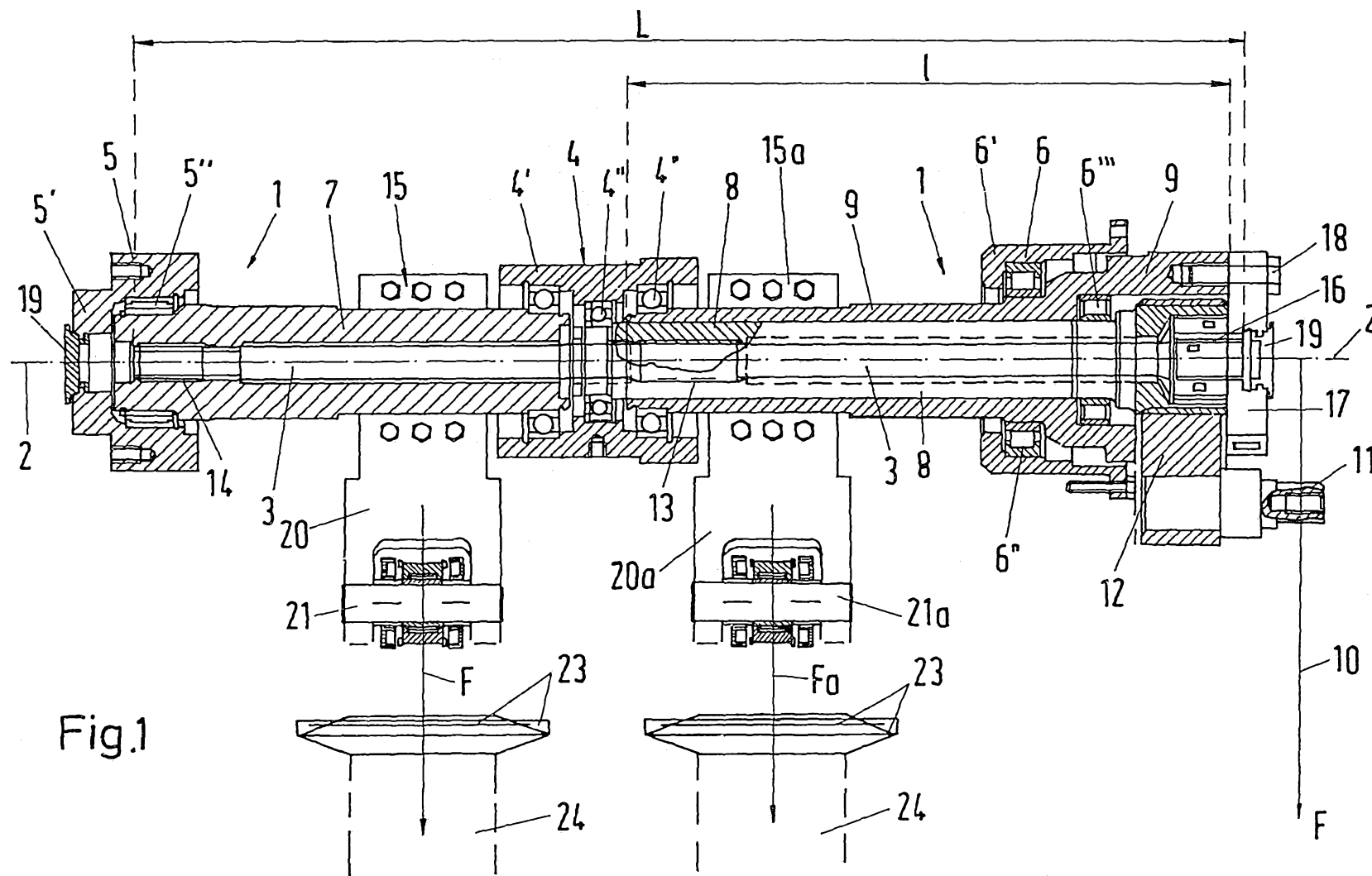
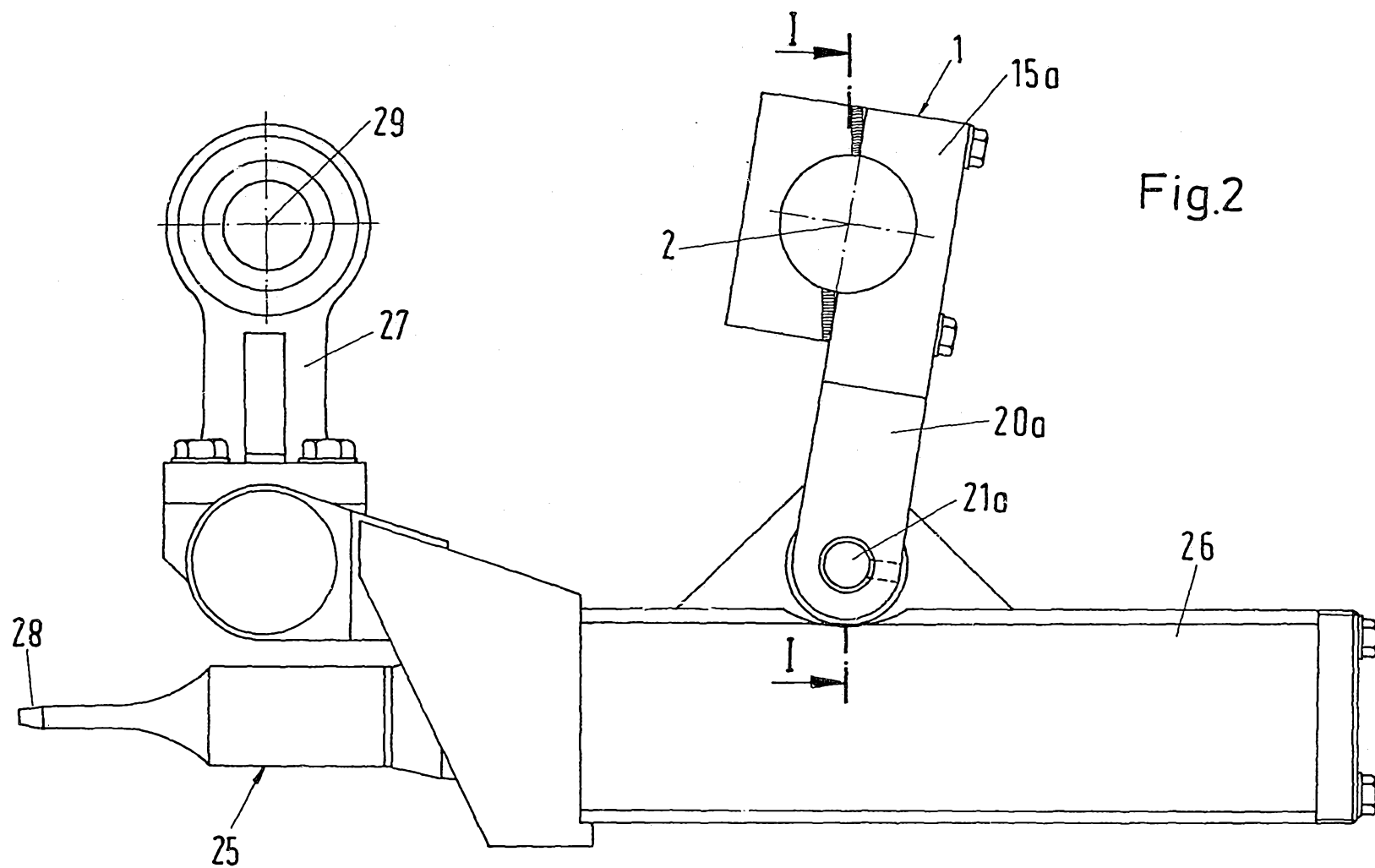


Fig.1

28253/92

10 11 90

26283



10 11 92 20253

