

# 592819

COMMONWEALTH of AUSTRALIA

PATENTS ACT 1952

APPLICATION FOR A STANDARD PATENT



SECTION 34(4)(a) DIRECTION SEE FOLIO 10  
 NAME DIRECTED Bombardier Corporation  
Expressway I-95 Business Center, 3684 Meadow Lane  
Bensalem, Pennsylvania 19020, U.S.A.

hereby apply for the grant of a Standard Patent for an invention entitled:

"A PAIR OF STACKED SPRINGS FOR A RAILWAY CAR"

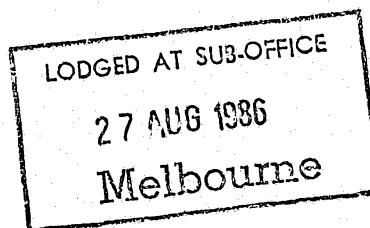
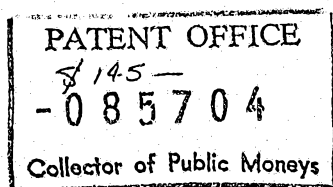
which is described in the accompanying ~~provisional~~ complete specification.

Details of basic application(s):—

<u>Number</u>	<u>Convention Country</u>	<u>Date</u>
793,930	UNITED STATES OF AMERICA	1 November, 1985.

APPLICATION ACCEPTED AND AMENDMENTS

ALLOWED 13.11.89



The address for service is care of DAVIES & COLLISON, Patent Attorneys, of 1 Little Collins Street, Melbourne, in the State of Victoria, Commonwealth of Australia.

Dated this 27th day of August, 1986

To: THE COMMISSIONER OF PATENTS

*H. M. Rimington*  
 (a member of the firm of DAVIES & COLLISON for and on behalf of the Applicant).

Davies & Collison, Melbourne and Canberra.

COMMONWEALTH OF AUSTRALIA  
PATENTS ACT 1952-1973  
DECLARATION IN SUPPORT OF CONVENTION OR  
NON-CONVENTION APPLICATION FOR A PATENT  
OR PATENT OF ADDITION

Insert title of invention.

In support of the Application made for a ~~patent~~  
~~patent of addition~~ for an invention  
entitled: "A PAIR OF STACKED SPRINGS FOR A RAILWAY CAR"

Insert full name(s) and address(es)  
of declarant(s) being the appli-  
cant(s) or person(s) authorized to  
sign on behalf of an applicant  
company.

I ~~We~~ Thomas I. Davenport  
of THE BUDD COMPANY  
of 3155 West Big Beaver Road  
Troy, Michigan 48084  
United States of America

Cross out whichever of paragraphs  
1(a) or 1(b) does not apply  
1(a) relates to application made  
by individual(s)  
1(b) relates to application made  
by company; insert name of  
applicant company.

do solemnly and sincerely declare as follows:-

1. (a) ~~I am~~ the applicant..... for the ~~patent~~  
~~We are~~ ~~patent of addition~~  
or (b) I am authorized by  
THE BUDD COMPANY

Cross out whichever of paragraphs  
2(a) or 2(b) does not apply

the applicant..... for the ~~patent~~  
~~patent of addition~~ to make this declaration on ~~its~~ behalf.

2(a) relates to application made  
by inventor(s)  
2(b) relates to application made  
by company(s) or person(s) who  
are not inventor(s); insert full  
name(s) and address(es) of inven-  
tors.

2. (a) ~~I am~~ the actual inventor..... of the invention.  
~~We are~~  
or (b)  
George Mekosh, Jr., of 963 Easton Road,  
Warrington, Pennsylvania 18976  
United States of America

~~is~~ the actual inventor..... of the invention and the facts upon which the applicant.....  
~~are~~  
~~is~~  
~~are~~ entitled to make the application are as follows:-

State manner in which applicant(s)  
derive title from inventor(s)

The Applicant is the Assignee of the actual inventor  
in respect of the invention.

Cross out paragraphs 3 and 4  
for non-convention applications.  
For convention applications,  
insert basic country(s) followed  
by date(s) and basic applicant(s).

3. The basic application..... as defined by Section 141 of the Act ~~was~~ made  
the United States of America ~~XXXXXXX~~ 1 Nov. 1985  
in ..... George Mekosh, Jr. on the .....  
by .....  
in ..... on the .....  
by .....  
in ..... on the .....  
by .....

4. The basic application..... referred to in paragraph 3 of this Declaration ~~was~~  
the first application..... made in a Convention country in respect of the invention the subject  
of the application. ~~were~~

Insert place and date of signature.

Declared at Troy, MI this 12th day of September, 1986

Signature of declarant(s) (no  
attestation required)

Note: Initial all alterations.

THE BUDD COMPANY

Thomas I. Davenport  
Assistant Secretary

DAVIES & COLLISON, MELBOURNE and CANBERRA.

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(12) PATENT ABRIDGMENT (11) Document No. AU-B-62009/86  
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 592819

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(54) Title  
STACKED SPRINGS

International Patent Classification(s)  
(51)<sup>d</sup> B61F 005/08 F16F 001/34 F16F 003/08

(21) Application No. : 62009/86 (22) Application Date : 27.08.86

(30) Priority Data

(31) Number (32) Date (33) Country  
793930 01.11.85 US UNITED STATES OF AMERICA

(43) Publication Date : 07.05.87

(44) Publication Date of Accepted Application : 25.01.90

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(56) Prior Art Documents  
US 3904181  
US 3762694  
US 3606295

(57) Claim

1. In combination with a railway car including a main body and a truck having a bolster,

suspension means connected between said main body and truck comprising:

(a) first and second axially aligned stacked springs, at least the first of which is made of elastomeric material formed using plies of reinforced material and at least one of said springs having a centre opening therethrough,

(b) a mid-plate assembly connected between said springs, said mid-plate assembly including a centre opening axially aligned with said centre opening of said at least one spring, and

(c) means for restricting the lateral movement of at least said one of said stacked springs including an axially projecting member secured either to the main body or to the truck and extending into said centre openings of said one spring and of the mid-plate assembly in which latter opening the projection member is closely retained so as to prevent non-axial movement of the mid-plate assembly,

(11) AU-B-62009/86  
(10) 592819

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whereby both of said springs are free to move vertically, with the other of said springs being free to move vertically and laterally.

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COMMONWEALTH OF AUSTRALIA

PATENT ACT 1952

COMPLETE SPECIFICATION

(Original)

FOR OFFICE USE

Class

Int. Class

Application Number: 62009/86  
Lodged:

Complete Specification Lodged:  
Accepted:  
Published:

Priority:

Related Art:

This document contains the  
amendments made under  
Section 49 and is correct for  
printing.



Name of Applicant:

Bombardier Corporation  
THE-BUDD-COMPANY

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Actual Inventor(s):

George MEKOSH Jr.

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1 Little Collins Street, Melbourne, 3000.

Complete Specification for the invention entitled:

"A PAIR OF STACKED SPRINGS FOR A RAILWAY CAR"

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

A PAIR OF STACKED SPRINGS  
FOR A RAILWAY CAR

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BACKGROUND OF THE INVENTION

In many cases mechanical springs are used in railway car suspension systems, sometimes accompanied by bellows air spring. Mechanical springs generally cause vibrations, surges, and noise which are generally transmitted from the truck to the car body. This causes passenger discomfort. The vibrations, surges, and noise result from a number of operating conditions. For example, the mechanical springs may have natural frequencies at which they tend to vibrate. Sudden impacts transmitted from the tracks through the wheels of the truck may cause surges and noise in the springs, which in turn are transmitted to the car body.

Different types of damping elements have been used in connection with mechanical springs. Generally, these have been located at the top and bottom of the springs. Such arrangements have not been entirely successful in sufficiently damping the vibrations and preventing them from being transmitted to the railway car body.

Recently there have been developed by Firestone, a so-called "Marsh Mellow"<sup>(R)</sup> spring, which eliminate many problems relating to vibrations. One example of these springs include an elastomeric core with a hollow center with several

plies of cord-reinforced fabric serving as the outer cover.

In railway car applications, it was found that it is necessary to provide springs for a suspension system which control the relative spring rates between the vertical and lateral movements. Very often, it is desirable to provide a predetermined vertical spring rate with restrictive lateral spring rates. Vertical spring rates in a single spring are limited because making a single spring too high creates a tendency of the spring to tilt over.

The main patents found during a search of the subject matter of this invention included 4,080,061; 3,910,655; 3,799,066; and 4,174,140. None of these patents disclosed a pair of stacked springs with one of the springs being elastomeric and one being restrictive in lateral movement.

#### OBJECTS OF THE INVENTION

It is an object of this invention to provide an improved suspension spring system between a railway car body and truck, in which a predetermined vertical spring rate is provided with a restricted lateral spring rate.

It is a further object of this invention to provide an improved suspension spring system for a railway car in which mechanical vibrations are minimized.

1 SUMMARY OF THE INVENTION

2

3 In accordance with the present invention, there is  
4 provided in combination with a railway car including a main  
5 body and a truck having a bolster,

6 suspension means connected between said main body and  
7 truck comprising:

8 (a) first and second axially aligned stacked springs,  
9 at least the first of which is made of elastomeric material  
10 formed using plies of reinforced material and at least one  
11 of said springs having a center opening therethrough,

12 (b) a mid-plate assembly connected between said  
13 springs, said mid-plate assembly including a center opening  
14 axially aligned with said centre opening of said at least  
15 one spring, and

16 (c) means for restricting the lateral movement of at  
17 least said one of said stacked springs including an axially  
18 projecting member secured either to the main body or to the  
19 truck and extending into said centre openings of said one  
20 spring and of the mid-plate assembly in which latter opening  
21 the projection member is closely retained so as to prevent  
22 non-axial movement of the mid-plate assembly,

23 whereby both of said springs are free to move  
24 vertically, with the other of said springs being free to  
25 move vertically and laterally.

26

27 Other objects and advantages of the present invention  
28 will be apparent and suggest themselves to those skilled in  
29 the art from a reading of the following specification and  
30 claims, taken in conjunction with the accompanying drawings.

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32 BRIEF DESCRIPTION OF THE DRAWINGS

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34 Fig. 1 is a partial view of a railway car, illustrating  
35 partly broken away and partly in cross-section a preferred  
36 embodiment of a pair of stacked elastomeric springs, in  
37 accordance with the present invention; and

38 Figs. 2 and 3 illustrate two additional embodiments of





1 a pair of stacked springs, in accordance with the present  
2 invention.

3

4 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

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6 Referring to Fig. 1, a portion of a railway car  
7 somewhat similar to the one illustrated in patent 4,355,583  
8 is illustrated. Because the invention is primarily directed

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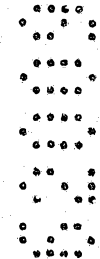
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toward having a pair of stacked springs between a railway car body and a truck, many elements associated with the truck and car body are not illustrated because they are known to those skilled in the art and only indirectly  
5 related to the present invention.

A suspension system 10 is disposed between a car body 12 and a truck 14. The suspension system includes a pair of stacked springs 16 and 18.

The truck 14 is adapted to receive a wheel axle  
10 assembly including the wheel 22, a side frame 24, a side bearing assembly 26 connected between the side frame 24 and a bolster 20. A wear plate 28 is connected between the side bearing 26 and the bolster 20. A lateral shock absorber 30 is connected between the truck 14 and the car body 12. Lateral bumpers 34 are provided to limit the lateral movement between the truck 14 and the car body 12. Because the invention is primarily concerned with the springs 16 and 18, no further reference will be made to the car body or truck.

20 The springs 16 and 18 may be, but not necessarily, comprise the so-called "Marsh-Mellow" type made by Firestone previously mentioned. These springs 16 and 18 include elastomeric cores 36 and 38 with hollow center openings 40 and 42, respectively. The spring 16 includes plies of a  
25 cord reinforced fabric 44 which provides an outer cover.

Likewise, the spring 18 includes plies of a cord reinforced fabric 46 which provides an outer cover. No claim to the composition of the elastomeric springs per se is made. The invention is directed toward the manner in which the springs are used.

A spacer element 48 is connected between the bolster 20 and a bottom plate assembly 50. The bottom plate assembly 50 may be a single piece or made of a number of pieces welded or otherwise connected together.

A bottom plate assembly includes a bottom plate 52 with an upwardly extending restricting member extending upwardly through opening 42 partly into the opening 40. The restricting member includes a bottom portion 54 having a diameter corresponding to the opening 42, a central tapered portion 56 and an upper portion 58.

A top plate assembly includes a plate 60 secured to the car body 12 having a central element 62 extending downwardly into the opening 40.

A central plate assembly includes a plate 64 having a central opening. An upwardly extending portion 66 and a downwardly extending portion 68 are provided to permit the portion 58 to be moved therethrough. A low friction bearing surface 69 is provided to prevent metal-to-metal contact between portion 58 and portions 66 and 68 during relative movements therebetween.

In operation, consider first the vertical movement. Under heavy loads, the springs 16 and 18 will tend to

compress vertically and expand. While they are being compressed, they will be held in place by the upper narrow portion 58, guided by the central plate 64 and projecting portions 66 and 68. The two springs 16 and 18 are free to move vertically without any restrictions. Consequently, the full vertical characteristics of the springs 16 and 18 are employed.

In considering the lateral movements of the springs 16 and 18, the top spring 16 is allowed to move to a great extent in the lateral direction. The lower spring 18, however, is restricted by the lower portion 54 as well as the downwardly extending portion 68 which are disposed within the center opening 42 of the spring 18. The degree of lateral movement of the spring 16 is dependent upon how far the upper narrow portion 58 and upwardly extending portion 66 extend into the opening 40. Basically, in the present invention, it is contemplated to give free vertical movements for both springs with a limited lateral movement for at least one of the springs in the manner illustrated.

Referring to Fig. 2, a second embodiment of the invention includes a pair of stacked springs 70 and 72. The spring 70 comprises an elastomeric member similar to the one illustrated in Fig. 1. The bottom spring 72 comprises a conventional air spring or bellows type spring, known to those skilled in the art. The bottom spring 72 is restricted from moving laterally by any conventional means

which may be employed outside the air springs or by elements within the air spring (not illustrated).

Referring to Fig. 3, another embodiment of the present invention includes a bottom elastomeric spring 74  
5 and a top mechanical spring 76. Again, the elastomeric spring 74 may be restricted in lateral movement by means illustrated in connection with the spring 18 of Fig. 1, or by other mechanical elements.

While Fig. 1 is the preferred embodiment,  
10 in some cases it is recognized that the embodiments of Figs. 2 and 3 having an air spring or a mechanical spring may have some advantages or be necessary in special situations where the maximum freedom from vibrations and the like are not critical.

1 THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

2

3 1. In combination with a railway car including a main body  
4 and a truck having a bolster,

5 suspension means connected between said main body and  
6 truck comprising:

7 (a) first and second axially aligned stacked springs,  
8 at least the first of which is made of elastomeric material  
9 formed using plies of reinforced material and at least one  
10 of said springs having a centre opening therethrough,

11 (b) a mid-plate assembly connected between said  
12 springs, said mid-plate assembly including a centre opening  
13 axially aligned with said centre opening of said at least  
14 one spring, and

15 (c) means for restricting the lateral movement of at  
16 least said one of said stacked springs including an axially  
17 projecting member secured either to the main body or to the  
18 truck and extending into said centre openings of said one  
19 spring and of the mid-plate assembly in which latter opening  
20 the projection member is closely retained so as to prevent  
21 non-axial movement of the mid-plate assembly,

22 whereby both of said springs are free to move  
23 vertically, with the other of said springs being free to  
24 move vertically and laterally.

25

26 2. A combination as set forth in claim 1 wherein said  
27 projecting member extends at least partly into a centre  
28 opening of said first spring.

29

30 3. The combination as set forth in claim 2 wherein a top  
31 plate is disposed on the top of the upper one of said  
32 stacked springs, said top plate having a centrally disposed  
33 restraining element extending downwardly into the centre  
34 opening of said upper one of said stacked elastomeric  
35 springs.

36

37 4. A combination as set forth in claim 3 wherein said  
38 projecting member includes a bottom portion corresponding to



1 the centre opening of the bottom spring and a top portion  
2 corresponding to the centre opening in said mid-plate  
3 assembly.

4  
5 5. A combination as set forth in claim 1 wherein said  
6 stacked springs comprise upper and lower springs, with said  
7 upper spring comprising an elastomeric spring having a  
8 centre opening and said lower spring comprising an air  
9 spring.

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11 6. A combination as set forth in claim 1 wherein said  
12 stacked springs comprise upper and lower springs, with said  
13 lower spring comprising an elastomeric spring having a  
14 centre opening and said upper spring comprising a mechanical  
15 spring.

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19 Dated this 30th day of October, 1989.

20 BOMBARDIER CORPORATION

21 By its Patent Attorneys

22 Davies & Collison

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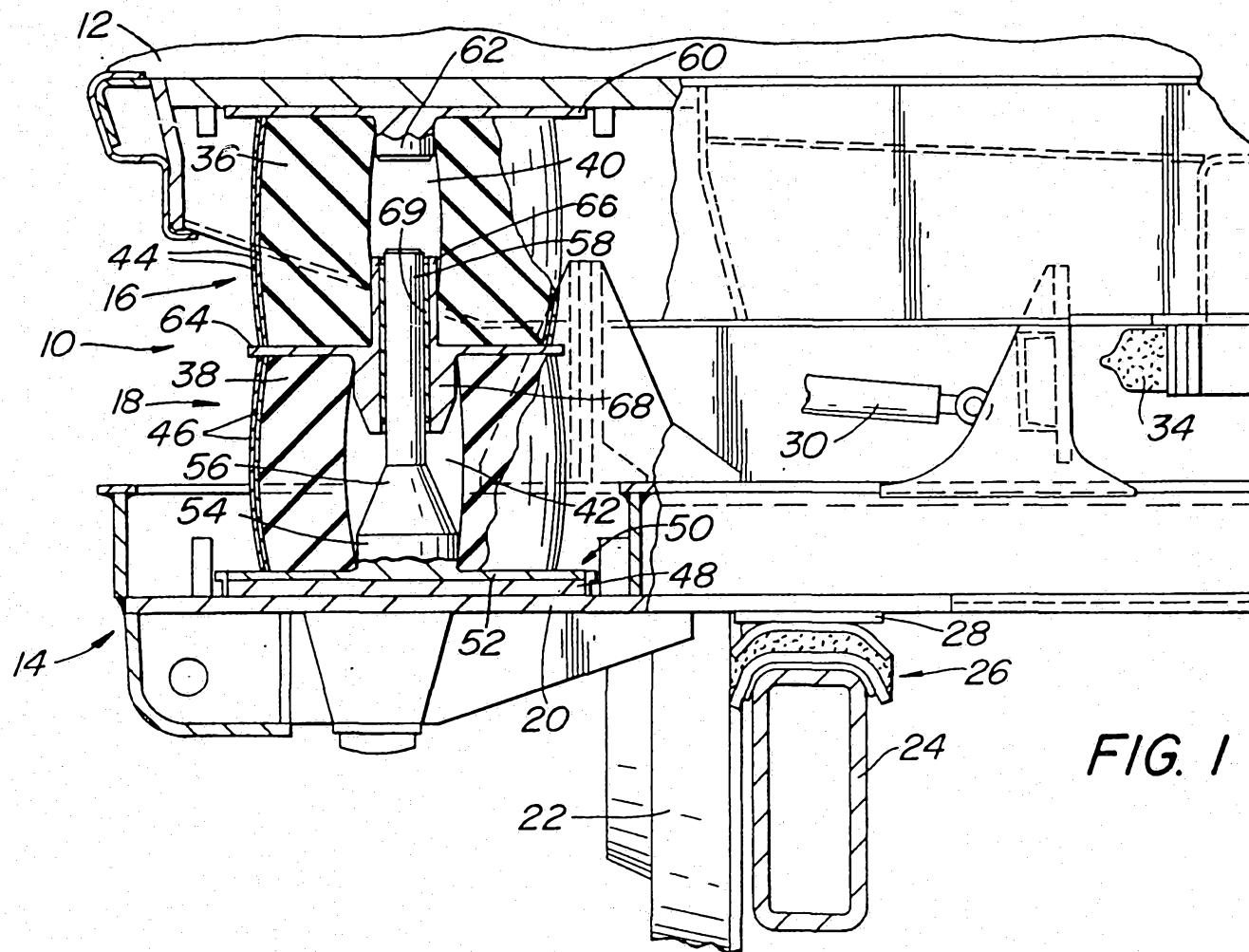


FIG. 1

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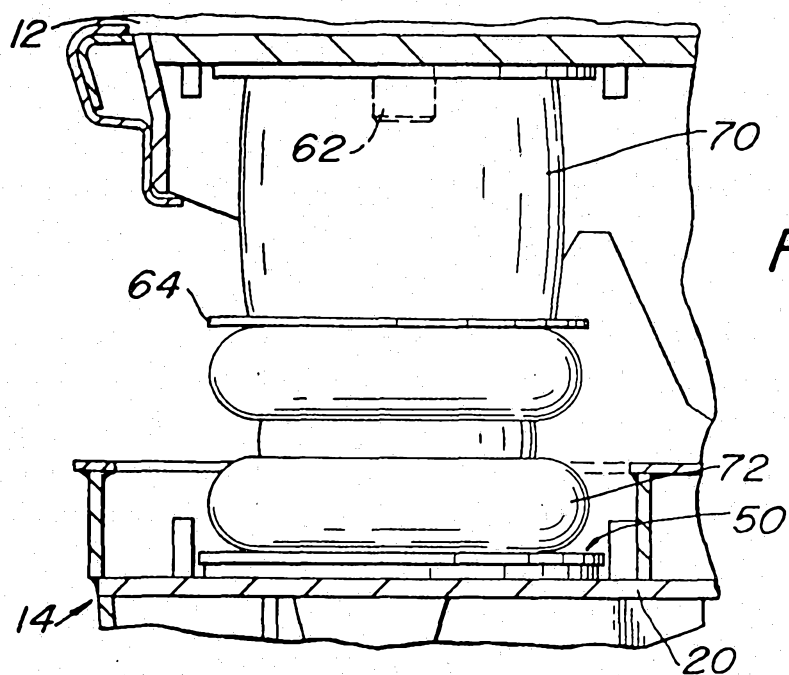


FIG. 2

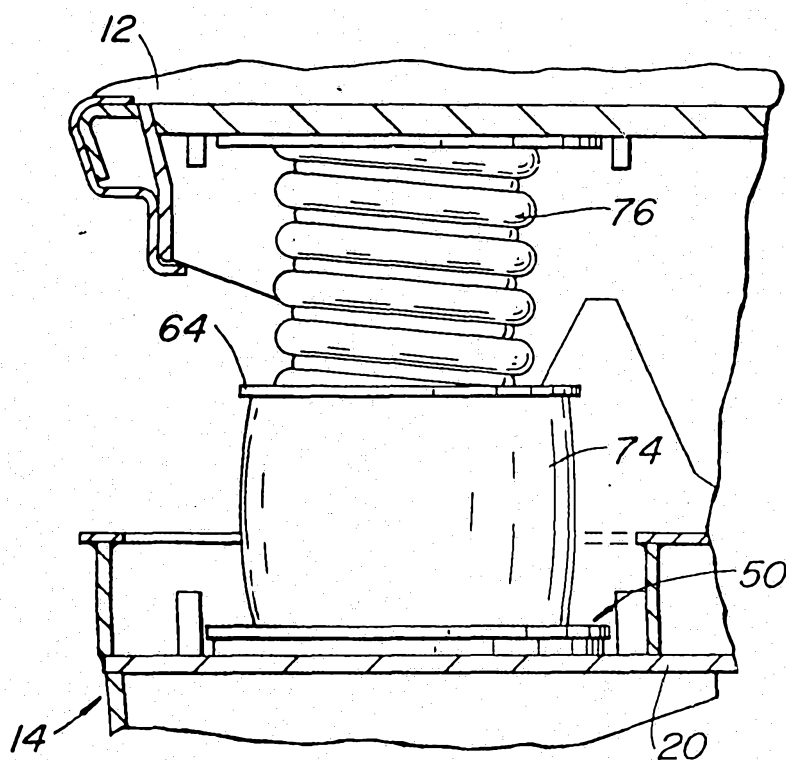


FIG. 3