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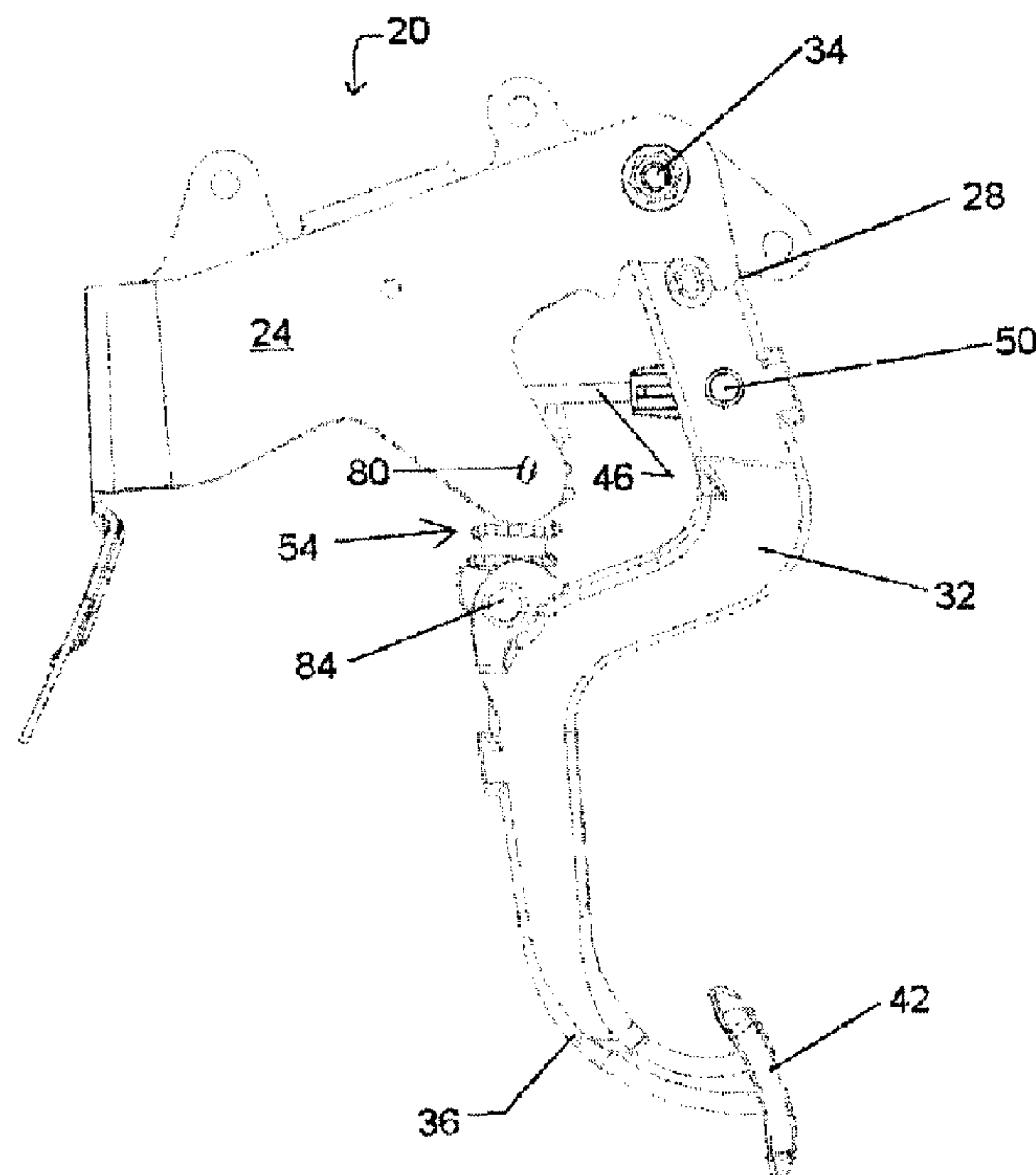
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(54) Titre : PEDALE DE COMMANDE ET MECANISME D'ASSISTANCE

(54) Title: CONTROL PEDAL AND ASSIST MECHANISM



(57) Abrégé/Abstract:

A control pedal for vehicles includes an assist mechanism to reduce the force require to operate the pedal over a portion of the pedal stroke. The assist mechanism includes a body having a first end pivotally connected to one of the frame and pedal arm and having a second end with a slot to slidably receive a pin mounted to the other of the frame and pedal arm. A biasing means acts between a portion of the body and a moveable stop on the body and the body is mounted between the pedal arm and the pin such that, when the pedal arm is in an "at rest" position, the pin acts against the moveable stop to compress the biasing means and as the pedal is moved from the "at rest" position, the biasing means exerts force between the pedal arm and the pin to assist the movement of the pedal arm along its stroke until the moveable stop reaches an end stop, after which further movement of the pedal arm is unassisted.



ABSTRACT

A control pedal for vehicles includes an assist mechanism to reduce the force require to operate the pedal over a portion of the pedal stroke. The assist mechanism includes a body having a first end pivotally connected to one of the frame and pedal
5 arm and having a second end with a slot to slidably receive a pin mounted to the other of the frame and pedal arm. A biasing means acts between a portion of the body and a moveable stop on the body and the body is mounted between the pedal arm and the pin such that, when the pedal arm is in an “at rest” position, the pin acts against the moveable stop to compress the biasing means and as the pedal is moved from the “at
10 rest” position, the biasing means exerts force between the pedal arm and the pin to assist the movement of the pedal arm along its stroke until the moveable stop reaches an end stop, after which further movement of the pedal arm is unassisted.

CONTROL PEDAL AND ASSIST MECHANISM**FIELD OF THE INVENTION**

The present invention relates to a control pedals and assist mechanisms
5 therefor. More specifically, the present invention relates to a vehicle control pedal
and biasing mechanism to assist the vehicle operator when engaging the vehicle
control pedal, such as a clutch pedal.

BACKGROUND OF THE INVENTION

10 Many vehicle control pedals can have or require non-linear responses. For
example, vehicle clutch pedals typically require more force to initially disengage the
clutch than they do further in their travel and vehicle engineers typically specify a
desired force versus stroke curve that they wish the pedal to meet.

To reduce the force required to operate the clutch, or other control, during the
15 beginning of the pedal stroke various assist mechanisms have been employed in the
past. To date, one of the more common assist mechanisms has been a torsion spring
connected between the pedal arm and the pedal mounting bracket. When the pedal is
pressed to engage a control, such as a clutch, this spring biases the pedal towards the
engaged position, reducing the amount of pedal force required to move the pedal
20 through its initial stroke. As the pedal returns to its initial position, when the pedal is
released, the spring is tensioned again, storing energy for the start of the next stroke.
Other similar spring-based assist mechanisms are also known.

While the known spring assist mechanisms do work, they do suffer from
problems. In particular, designing such a spring assist to meet a specified force versus
25 stroke curve can be difficult or impossible. This difficulty is exacerbated by the fact
that the assist mechanisms often act, at least to some extent, over the complete
intended stroke of the pedal and thus desired assistance at one point of the stroke can
have an undesired effect at other points in the stroke.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a novel control pedal and assist mechanism which obviates or mitigates a disadvantage of the prior art.

5 According to a first aspect of the present invention, there is provided a control pedal comprising: a frame for mounting to a vehicle; a pedal arm pivotally attached to the frame and the pedal arm having a control arm attached thereto; and an assist mechanism including: a body having a first end pivotally connected to one of the frame and pedal arm and having a second end with a slot to slidably receive a pin
10 mounted to the other of the frame and pedal arm; and a biasing means acting between a portion of the body and a moveable stop on the body, wherein the body is mounted between the pedal arm and the pin such that when the pedal arm is in an at rest position, the pin acts against the moveable stop to compress the biasing means and as the pedal is moved from the at rest position, the biasing means exerts force between
15 the pedal arm and the pin to assist the movement of the pedal arm along its stroke until the moveable stop reaches an end stop, after which further movement of the pedal arm is unassisted.

Preferably, the biasing means is at least one helical spring. The helical spring can be variably wound to alter the assistance force provided by the assist mechanism
20 at different portions of the pedal stroke. Also, the biasing means can comprise two helical springs with different spring force constants and these springs can be arranged coaxially or in series.

According to another aspect of the present invention, there is provided an assist mechanism for a control pedal, comprising: a body having a first end pivotally
25 connected to one of a fixed point on the vehicle and a pedal arm and having a second end with a slot to slidably receive a pin mounted to the other of the fixed point on the vehicle and the pedal arm; and a biasing means acting between a portion of the body and a moveable stop on the body, wherein the body is mounted between the pedal arm and the pin such that when the pedal arm is in an at rest position, the pin acts against
30 the moveable stop to compress the biasing means and as the pedal is moved from the

at rest position, the biasing means exerts force between the pedal arm and the pin to assist the movement of the pedal arm along its stroke until the moveable stop reaches an end stop, after which further movement of the pedal arm is unassisted.

5 BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the present invention will now be described, by way of example only, with reference to the attached Figures, wherein:

Figure 1 shows a side view of a control pedal assembly with assist mechanism in accordance with the present invention with the pedal at the rest position;

10 Figure 2 shows a cut-away side view of the control pedal of Figure 1;

Figure 3a shows an exploded view of an assist mechanism in accordance with the present invention;

Figure 3b shows an assembled view of the assist mechanism of Figure 3a; and

Figure 4 shows the cut-away side view of Figure 2 with the pedal depressed.

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DETAILED DESCRIPTION OF THE INVENTION

A control pedal assembly with an assist mechanism in accordance with the present invention is indicated generally at 20 in Figure 1. Pedal assembly 20 includes a frame 24 which can be attached to a vehicle, not shown, and to which one end 28 of a pedal arm 32 is attached by a pivot pin 34. The other end 36 of pedal arm 28 has a footpiece 42 mounted to it.

Figure 2 shows a similar view of pedal assembly 20 to that of Figure 1, except that a portion of frame 24 has been removed in the Figure for clarity. As better seen in this Figure, an actuator linkage rod 46 is connected to pedal arm 32 adjacent first end 28 by a pivot pin 50. The end of linkage rod 46 distal pivot pin 50 is connected to the control device, not shown, operated by pedal assembly 20. The actual control device operated is not particularly limited and can include hydraulic master cylinders for clutch mechanisms and/or brakes or other devices.

As best seen in Figures 3a and 3b, the present invention includes an assist
30 mechanism 54 which comprises a biasing means carrier 58, at least one biasing

means, such as helical spring 62 and a moveable stop, such as retaining washer 66. Carrier 58 includes a longitudinal slot 70 along a portion of its length and carrier 58 has a first shoulder 74 against which one end of spring 62 abuts and a second shoulder 76 against which washer 66 will abut. The end of spring 62 distal shoulder 74 abuts washer 66 when mechanism 54 is assembled as shown in Figure 3b. The wedge shaped end of carrier 58 adjacent shoulder 76 allows spring 62 and washer 66 to be placed on carrier 58, with washer 62 temporarily compressing the sides of carrier 58 during assembly as washer 66 rides up the wedge surfaces until snaps over the end of the wedge surfaces and engages shoulder 76. Washer 66, and spring 62, are then captive on carrier 58

A stop pin 80, which is mounted to frame 24, rides in slot 70 and prevents compression of the wedge shaped end of carrier 58 to remove washer 66. Pin 80 can act against retaining washer 66, moving along slot 70, to compress spring 62 as described in more detail below. As shown in Figure 2, at the end of carrier 58 adjacent shoulder 74, carrier 58 is mounted to pedal arm 32 by a pivot pin 84.

With pedal arm 32 in the rest position illustrated in Figures 1 and 2, spring 62 is compressed by stop pin 80 which is located deep with slot 70 and which pushes washer 66 along the body of carrier 58 to compress spring 62. As can be seen, in this rest position, carrier 58 is positioned over-center with respect to the pivot point 34 of pedal arm 32 so that, as pedal arm 32 is depressed by a vehicle operator, compressed spring 62 will act between pin 84 on pedal arm 32 and stop pin 80 on frame 24, thus reducing the force the vehicle operator must employ to depress pedal arm 32.

As pedal arm 32 is further depressed, stop pin 80 will move along slot 70, away from shoulder 74, allowing spring 62 to decompress until washer 66 abuts shoulder as shown in Figure 4. Once spring 62 has extended such that washer 66 abuts shoulder 76, spring 62 provides no further force to pedal arm 36 and pin 80 is free to move along the balance of slot 70.

As the vehicle operator releases pedal arm 32, pin 80 will move back along slot 70 and again abut washer 66 and compress spring 62 until pedal arm 32 returns to the at rest position.

The present inventor believes that one of the advantages of the present invention is that when washer 66 abuts shoulder 76 and pin 80 is free to move along the balance of slot 70, assist mechanism 54 is effectively disengaged from pedal arm 32 and does not impact its operation over the balance of its stroke. Thus assist
5 mechanism 54 only has an effect at the initial portion of the stroke of pedal arm 32, as desired.

Further, additional variability to the amount of assist and the portion of the stroke over which assist mechanism 54 acts can be provided by altering spring 62. For example, spring 62 can be a variably wound helical spring to provide a different
10 spring force constant over its operating range. Also, two or more springs can be easily provided in a coaxial arrangement on carrier 58 with the springs being different lengths to provide different assist forces over different ranges of pedal movement. Further, such springs can have different spring force constants. Alternatively, the two or more helical springs can be arranged in series about body 58 to provide different
15 spring force constants at different portions of the stroke of pedal arm 32.

As will be apparent to those of skill in the art, while the embodiment of the invention illustrated herein has the carrier body 58 of assist mechanism 54 pivotally attached to pedal arm 32 with slot 70 engaging stop pin 80 mounted to frame 24, the present invention is not so limited. For example, the opposite configuration wherein
20 carrier body 58 is pivotally attached to frame 24 and stop pin 80, or equivalent, is connected to pedal arm 32 can also be employed.

As should also now be apparent to those of skill in the art, the present invention is not limited to the use of helical springs as biasing means and other biasing mechanisms such as gas springs, resilient members, etc. can be employed
25 without departing from the scope of the invention.

The above-described embodiments of the invention are intended to be examples of the present invention and alterations and modifications may be effected thereto, by those of skill in the art, without departing from the scope of the invention which is defined solely by the claims appended hereto.

Listing of Claims:

1. A control pedal for an automotive vehicle, the control pedal comprising:
 - a frame for mounting to the vehicle;
 - a pedal arm pivotally attached to the frame and the pedal arm having a control arm attached thereto; and
 - an assist mechanism including:
 - a body having a first end pivotally connected to the pedal arm and having a second end with an open-ended slot to slidably receive a pin mounted to the frame, the first end defining a first shoulder and the second end defining a second shoulder;
 - a moveable stop slidably mounted to the body between the first and second shoulders, wherein the pin and the moveable stop are free to move independently of one another; and
 - a biasing means acting between the first shoulder and the moveable stop on the body, wherein the body is mounted between the pedal arm and the pin such that when the pedal arm is in an at rest position, the pin acts against the moveable stop to compress the biasing means thereby urging the moveable stop away from the second shoulder and as the pedal arm is moved from the at rest position, the biasing means exerts force between the pedal arm and the pin to assist the movement of the pedal arm along its stroke until the moveable stop abuts the second shoulder, after which the pin moves freely along the slot separate from the moveable stop such that further movement of the pedal arm is unassisted.
2. A control pedal according to claim 1 wherein the biasing means is at least one helical spring.

3. A control pedal according to claim 2 wherein the helical spring is variably wound.
4. A control pedal according to claim 2 wherein the biasing means comprises two helical springs with different spring force constants.
5. A control pedal according to claim 4 wherein the two helical springs are arranged coaxially about the body.
6. A control pedal according to claim 4 wherein the two helical springs are arranged in series between the portion of the body and the moveable stop.
7. A control pedal according to claim 2 wherein the biasing means comprises two helical springs with different lengths.
8. A control pedal according to claim 7 wherein the biasing means comprises two helical springs with different spring force constants.
9. A control pedal according to claim 7 wherein the two helical springs are arranged coaxially about the body.
10. An assist mechanism for a control pedal for an automotive vehicle, the assist mechanism comprising:

a body having a first end pivotally connected to a pedal arm and having a second end with a slot to slidably receive a pin mounted to the vehicle, the first end defining a first shoulder and the second end defining a second shoulder;

a moveable stop slidably mounted to the body between the first and second shoulders, wherein the pin and the movable stop are free to move independently of one another; and

a biasing means acting between the first shoulder and the moveable stop on the body, wherein the body is mounted between the pedal arm and the pin such that when the pedal arm is in an at rest position, the pin is engaged with the moveable stop to compress

the biasing means thereby urging the moveable stop away from the second shoulder and as the pedal arm is moved from the at rest position, the biasing means exerts a force between the pedal arm and the pin to assist the movement of the pedal arm along its stroke until the moveable stop abuts the second shoulder, and is disengaged from the pin to allow the pin to move freely along the slot separate from the moveable stop such that further movement of the pedal arm is unassisted.

11. An assist mechanism according to claim 10 wherein the slot is an open-ended slot.
12. A control pedal according to claim 1 wherein the second end of the body is a wedge shaped end defining the second shoulder.

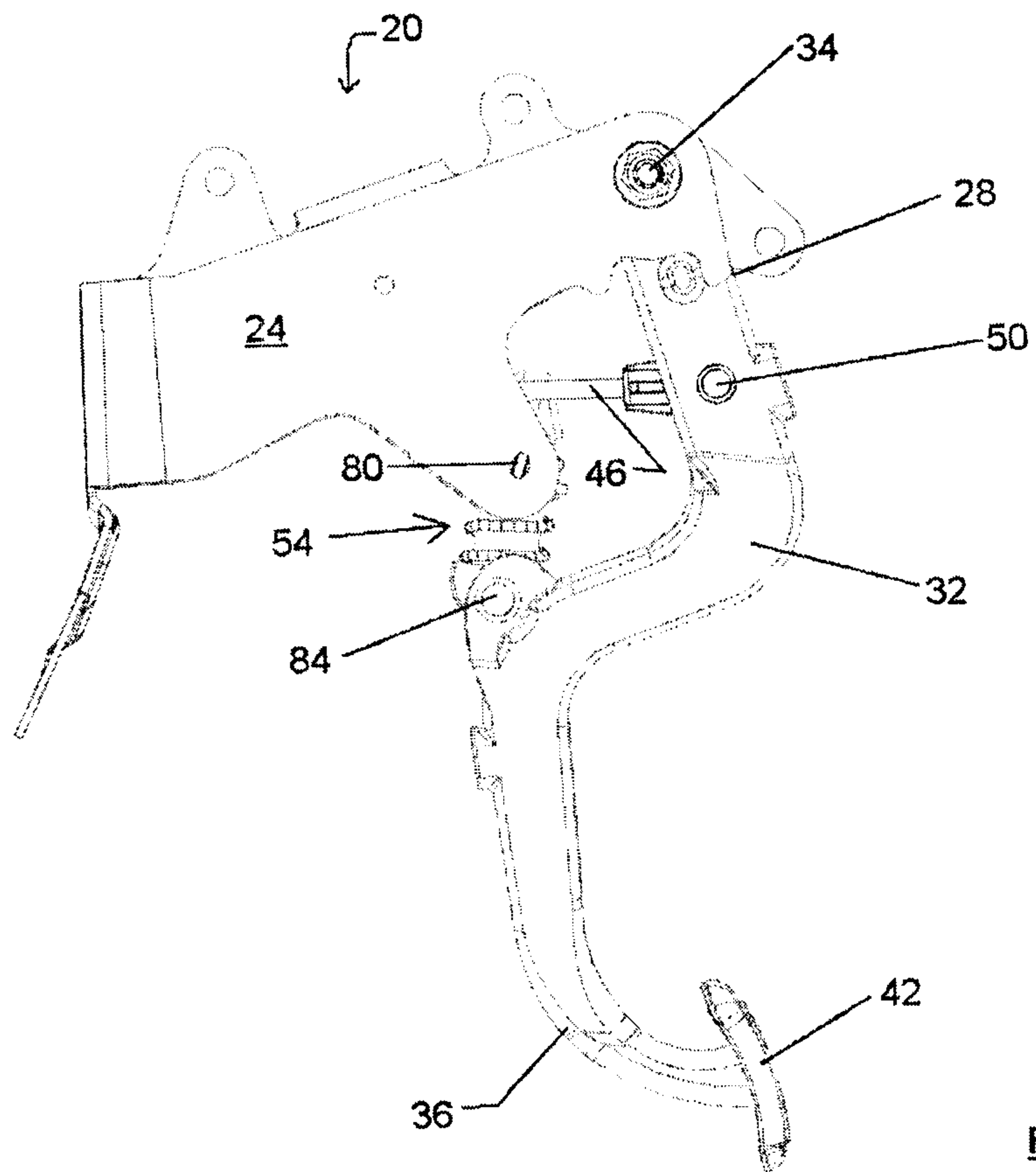


Fig. 1

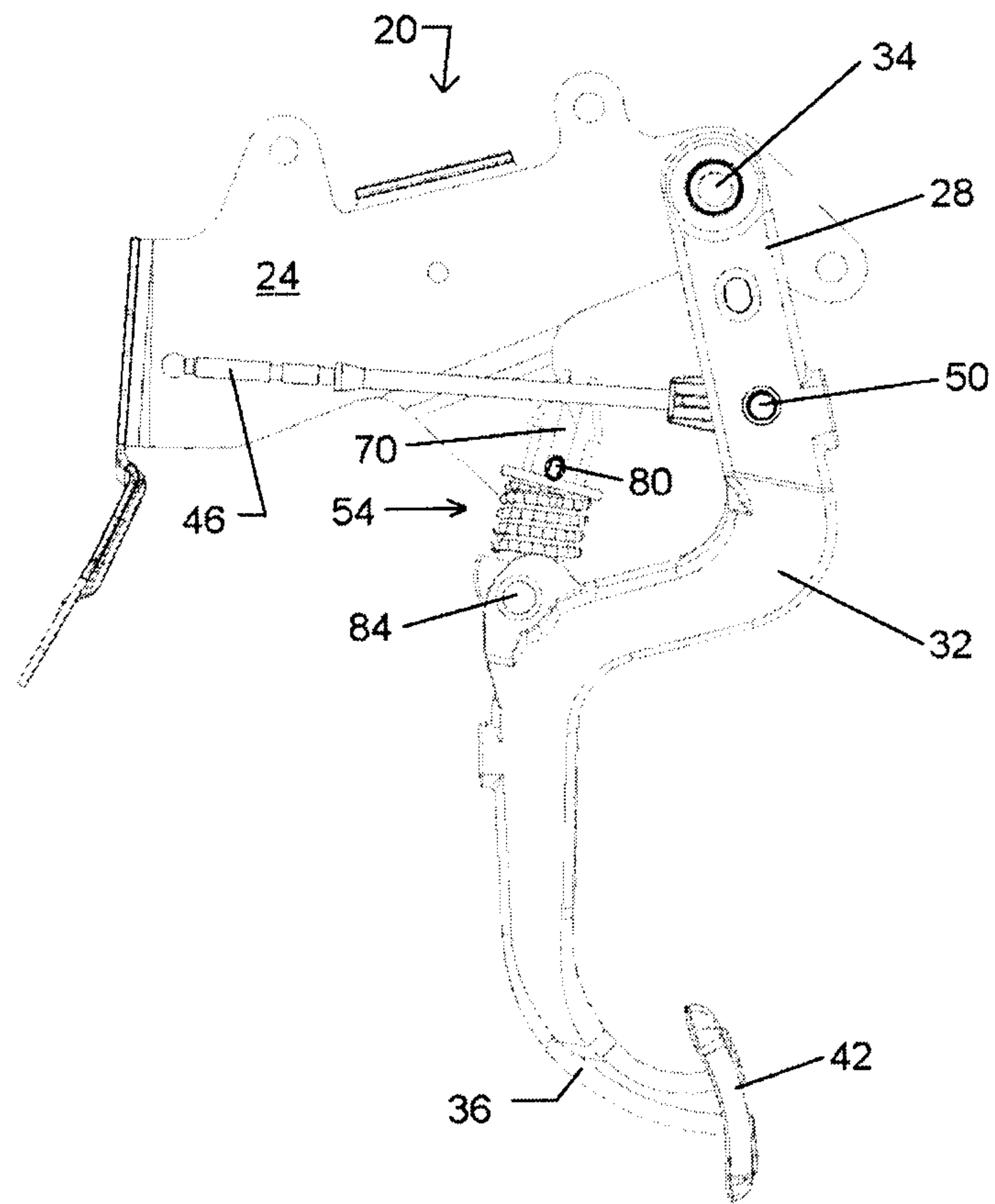


Fig. 2

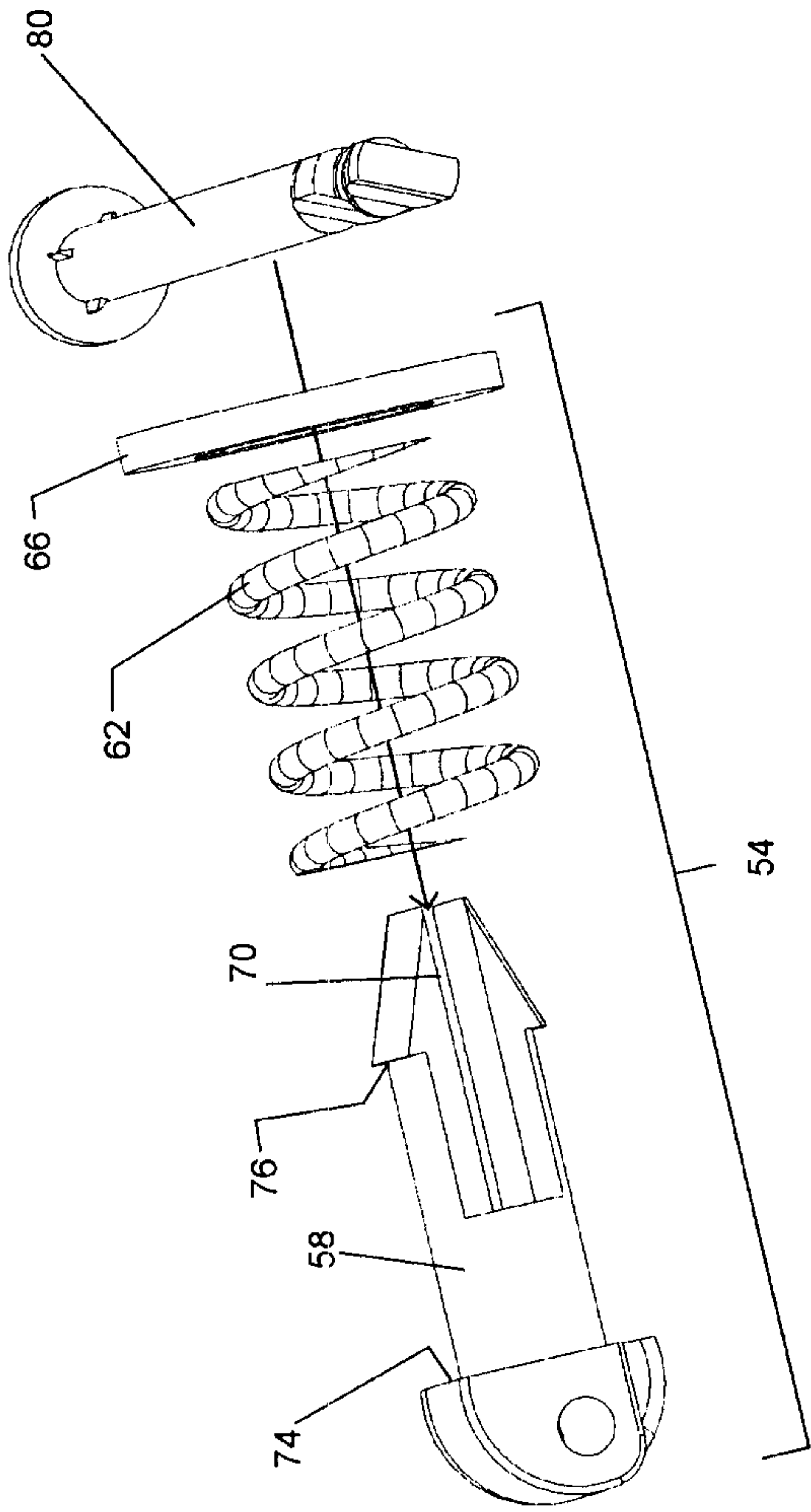


Fig. 3a

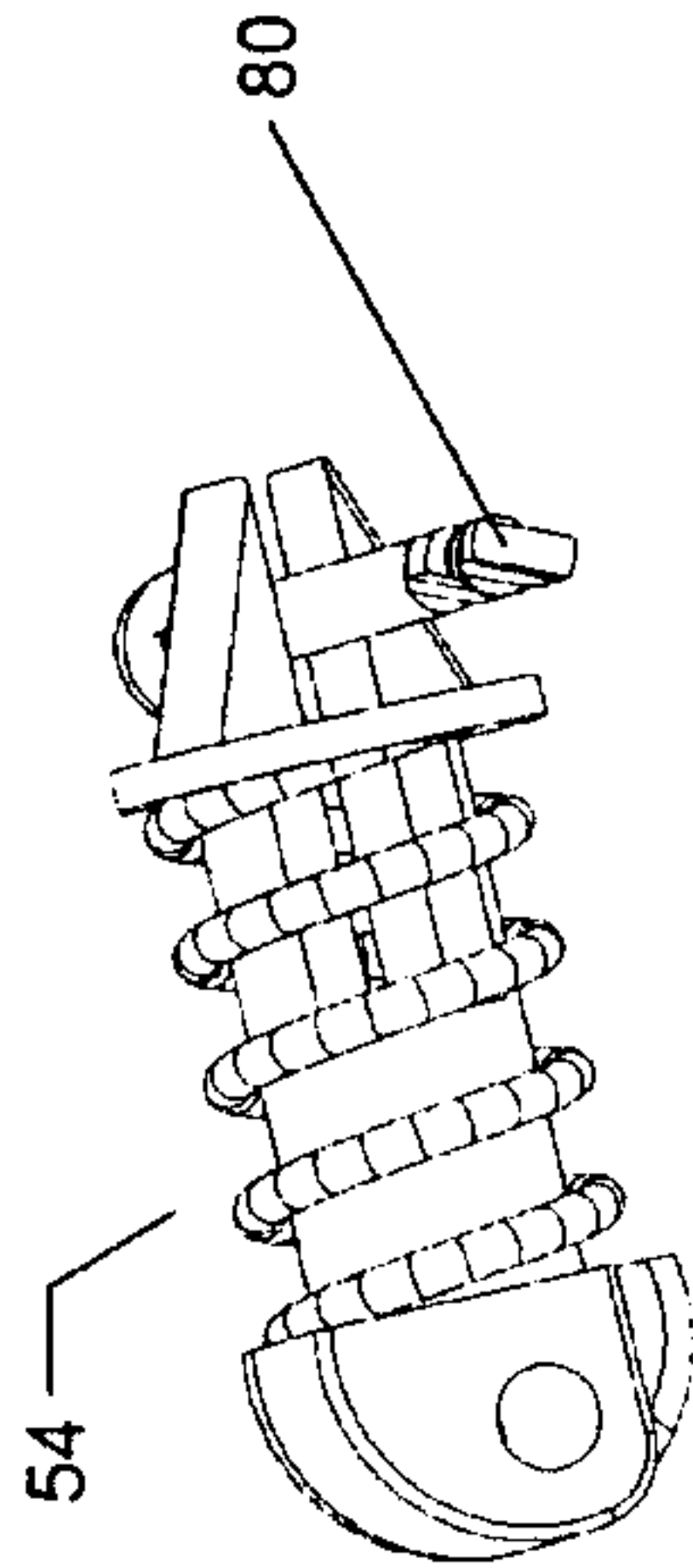


Fig. 3b

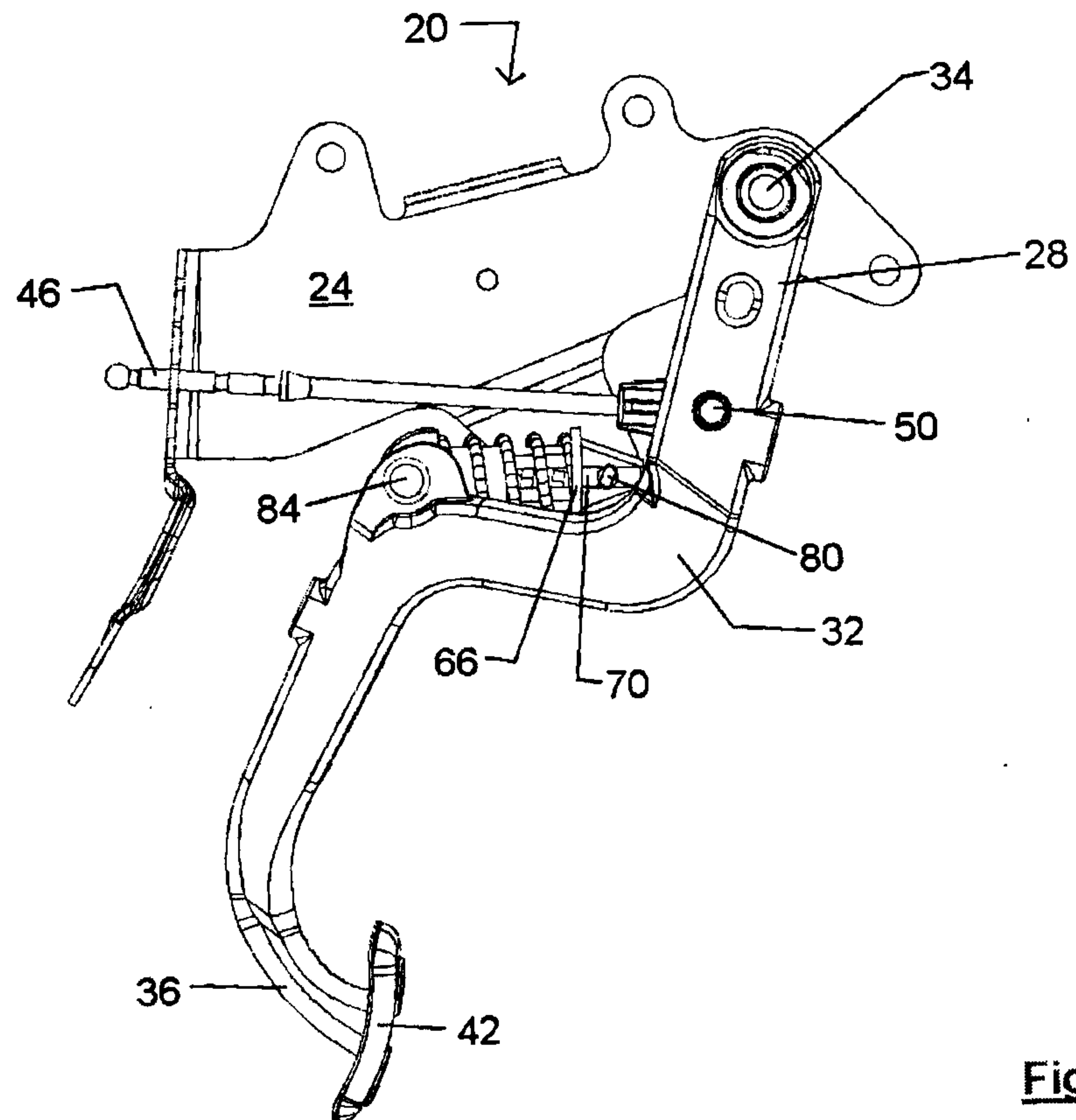


Fig. 4

