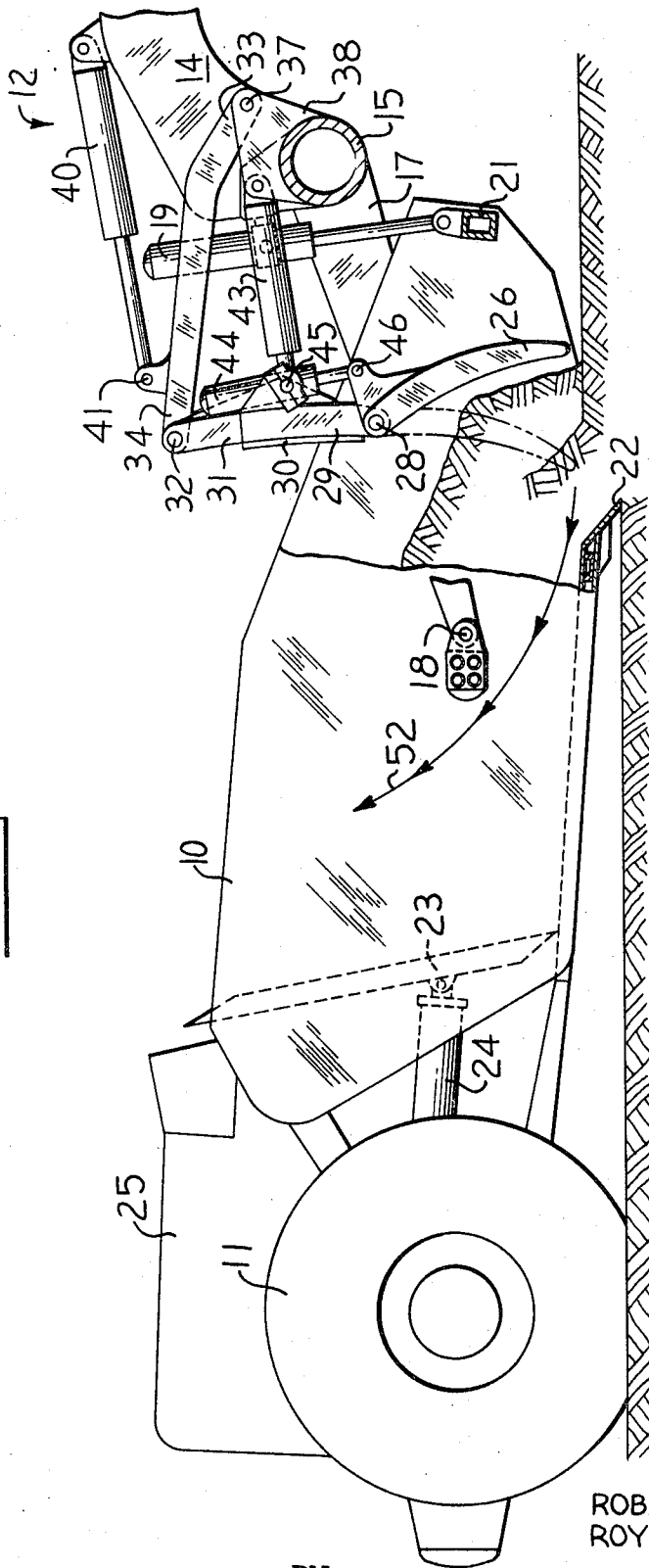




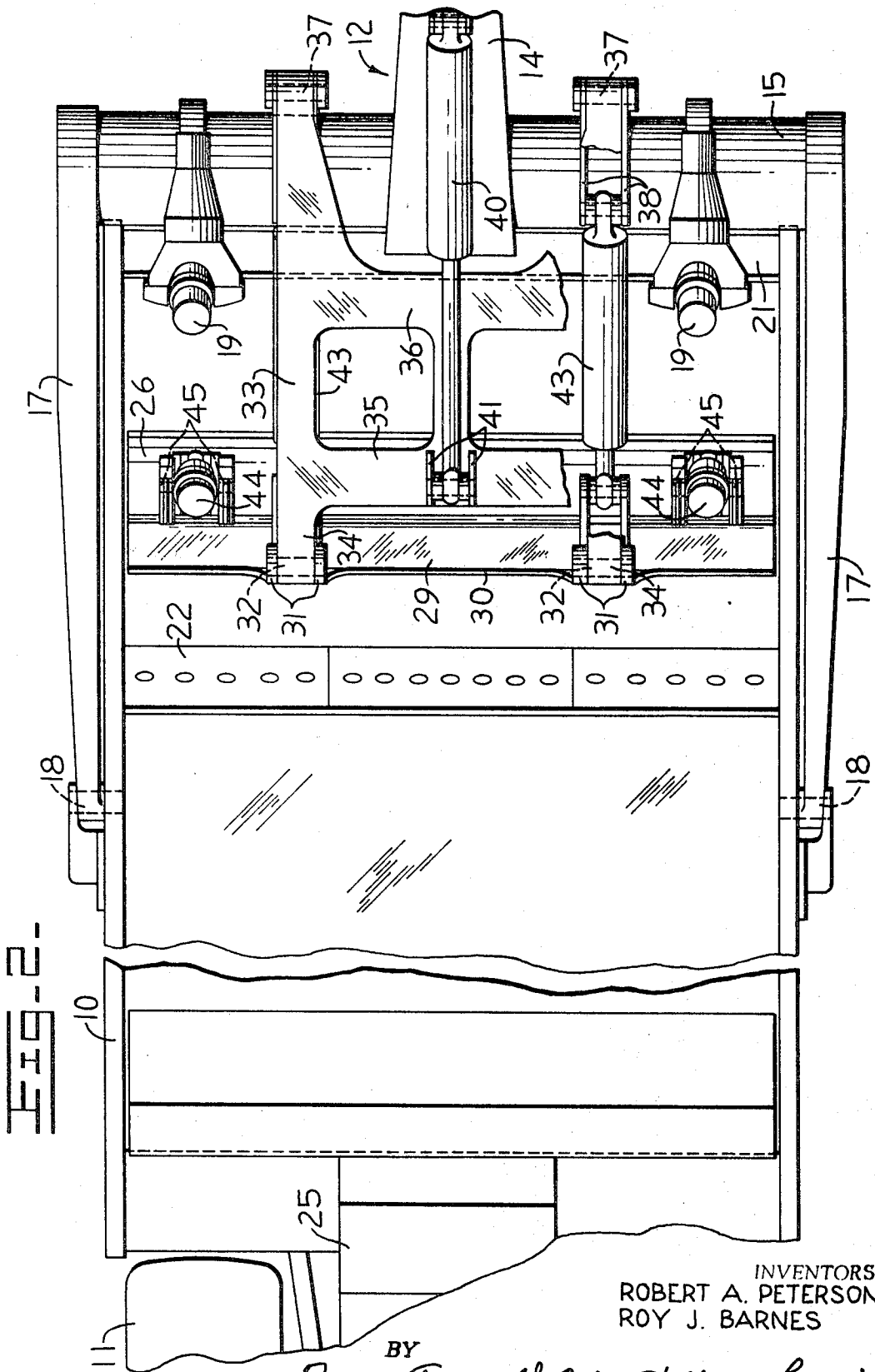
FIG. 1-



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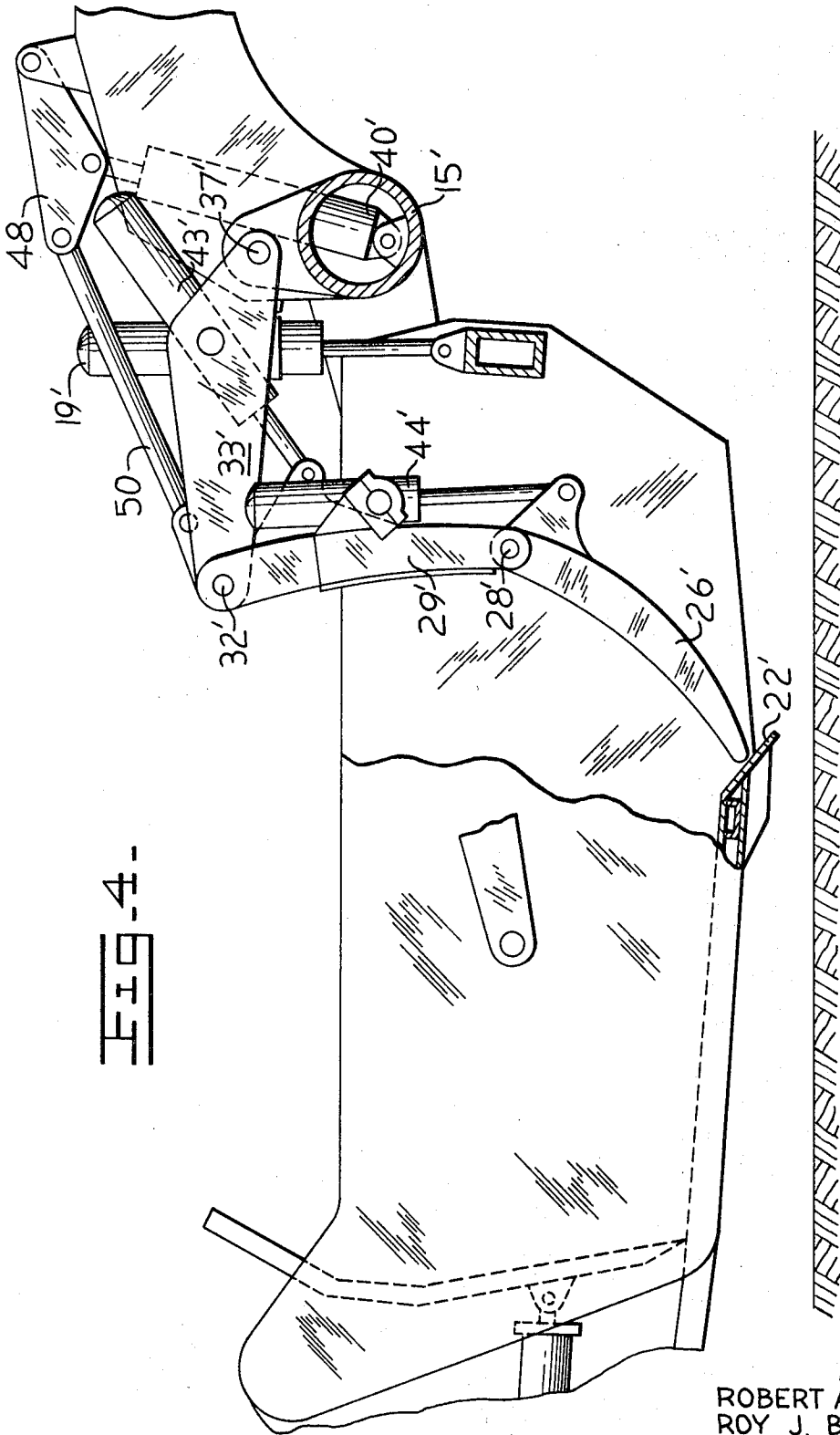


FIG. 4-

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## BACKHOE-TYPE SELF-LOADING SCRAPER

Several different types of self-loading scrapers have been designed in the search for a practical means for eliminating the need for pusher tractors during the load cycle of a scraper.

One type of self-loader is described in our Assignee's U.S. Pat. application of Robert A. Peterson, Ser. No. 589,978, now U.S. Pat. No. 3,471,952, entitled "Earthmoving Scraper with Multiply Articulated Apron Structure." Scrapers of this general type have the disadvantage that the center of gravity of the scraper bowl is raised when the apron is moved upwardly. Since the apron and connecting linkage are very heavy and the linkage is connected to the bowl, another disadvantage is that the linkage connecting the apron and bowl is often disposed in a position to interfere with the earth in the bowl as well as with parts of the bowl. The present invention is designed to overcome the above-noted disadvantages found in backhoe-type scraper loading devices and this is accomplished, as will be evident upon reading the following specification, by supporting the apron with linkage which is disposed between the apron and the tractor hitch forwardly of the bowl.

The invention is described in further detail by reference to the accompanying drawings in which:

FIG. 1 is a view in side elevation, with parts broken away and parts in section, of a scraper bowl and apron constructed in accordance with the present invention, the parts being in load position;

FIG. 2 is a plan view of the bowl shown in FIG. 1, disclosing the same loading mechanism;

FIG. 3 is a view like FIG. 1 but with the apron and supporting linkage shown in a position used after the bowl is partially filled; and

FIG. 4 is a side elevation of a scraper bowl with the modified type of apron supporting and controlling mechanism with the apron shown in its carry position.

In FIG. 1 of the drawings, a scraper of generally conventional design is shown as comprising a bowl 10 supported on wheels, one of which is shown at 11 at its rear end, and connected at its forward end to a tractor (not shown) through hitch means generally indicated at 12. The hitch means includes a gooseneck 14, the forward end of which is connected to the tractor. A spreader tube 15 extends outwardly on both sides of the gooseneck (see also FIG. 2) and supports a pair of draft arms 17 pivoted as at 18 to the sides of the bowl. Two bowl jacks, shown at 19 in FIGS. 1 and 2, extend between the spreader tube to which they are suitably bracketed and a forward transverse frame member 21 at the forward end of the bowl. Thus, extension and retraction of the jacks 19 lowers and raises the bowl between the digging position of FIG. 1 with a cutting edge 22 engaged in the earth, and the position of FIG. 4 where a cutting edge 22' is shown raised from the earth to a carry or transport position. The contents of the bowl may be discharged by an ejector, shown at 23 in FIG. 1, capable of being moved forwardly through the bowl as by a jack 24 all in a conventional manner. The bowl here shown has an engine disposed at 25 powering its wheels, though some scrapers depend entirely upon the power of the tractor which draws them plus an auxiliary pusher tractor when additional power is required.

The present invention is directed to the support and operating means for an apron 26, one function of which is to close the forward end of the bowl, after it has been loaded, by assuming the position of the apron 26' of FIG. 4. The apron 26 is of the backhoe-type and capable of being manipulated through the positions of FIGS. 1 and 3 during the loading cycle.

Referring to FIGS. 1 and 2, the apron is pivoted by pins 28 adjacent its upper edge to a support member 29 which has a faceplate 30 approximating one-half of its vertical height to form an effective extension of the apron 26. The apron support 29 has upwardly extending arms 31 which connect at their upper ends by pins 32 to the rear part of an H-shaped frame 33. The frame has two forwardly extending legs shown

at 34 in FIG. 2 and a pair of cross brace members 35 and 36. At their foremost ends, the legs 34 of the H-frame are pivoted as by pins 37 to two pairs of spaced brackets 38 secured to and extending upwardly from the spreader 15. Power means in the form of a hydraulic jack 40 extends between the top of the hitch gooseneck and the rearward portion of the H-frame 31, to which it is pivotally secured as by a bracket 41. A pair of hydraulic jacks 43, only one of which is shown, extend from brackets 38 to the rear of support member 29 for swinging the support member about its pivot 32. Another pair of hydraulic jacks 44 are trunnion mounted as at 45 to the front of support member 29 and extends downwardly to where their rod ends are pivotally connected as at 46 to the apron 26. Thus, with the three sets of jacks, including the jack 40, jacks 43 and jacks 44, the apron 26 can be adequately manipulated without any structure to its rear to interfere with the contents of the bowl or top loading thereof.

An important feature of the present invention, as disclosed in FIGS. 1, 2 and 3, is the connection of jacks 43 between the member 29 and spreader tube 15. With this arrangement, the jacks 43, the upper portion of member 29, the H-shaped frame 33 and bracket 38 form a modified parallelogram or trapezium structure which imparts a preferred action to the apron during certain portions of the operation when the entire structure is being rotated about pins 37. For example, with the jacks 43 fully retracted and the H-shaped frame 33 in a raised position, extension of jack 40 lowers the rearward end of frame 33 by rotation about pin 37. The trapezium linkage formed by the above-discussed members automatically corrects the position of member 29 and apron 26 by rotation about pins 32 to avoid interference of the apron 26 with the spreader member 21 disposed between the forward ends of the bowl sides. This desirable action is achieved by locating the pivot connection of jacks 43 to bracket 38 at a point substantially rearward of and slightly below the pivot connection 37 between frame 33 and bracket 38.

The above-described power-operated apron arrangement serves to enable full loading of the scraper without power from other sources. Examples of the positions which the apron assumes are shown in FIGS. 1 and 3. The full line position of the apron 26 in FIG. 1 shows it in advance of material which is piled up forwardly of the cutting edge 22. Rearward motion of the apron to the broken line position by extension of jacks 44 will move a great portion of the material over the cutting edge and into the forward portion of the bowl. With the apron 26 in approximately the broken line position of FIG. 1, extension of jacks 43 rotates the apron and member 29 about the pins 32 to the full line position of FIG. 3. This forces the material being loaded upward and rearward into the scraper bowl as is also illustrated in FIG. 3. The cylinders 44 are then retracted to move the apron to the broken line position while jacks 43 are also further extended to move the member 29 to the broken line position. Once this movement is accomplished, the jack 40 is retracted to swing the entire apron and support structure about pivot pin 37 to raise the apron clear of the material which has been loaded into the bowl. During the above-described action, further material has passed over the cutting edge to enter the forward portion of the bowl, as generally indicated at 47, with relatively little effort. At this point, the apron is returned to the full line position illustrated in FIG. 1 in readiness for sweeping an additional volume of material upward and rearward into the bowl until a full load is achieved. At that time, the apron will be closed by moving the parts to approximately the positions illustrated in FIG. 4.

FIG. 4 shows a modified form of the invention which is particularly adaptable to converting standard scrapers to self-loading scrapers. In this modification, the bowl is shown as being raised and lowered by jacks 19' comparable to the jacks 19 of FIG. 1. Raising and lowering of the apron assembly, including the support member 29', is accomplished by a jack 40' which already exists as an apron jack on many conventional scrapers and which extends between the spreader 15' and a lever 48. A link 50 extends between the

lever and a bracket at the rearward end of the member 33' to swing it about its pivotal supports 37'. A jack 43' swings the support member 29' about its pivotal connection 32'. Jacks 44' swing the apron about its pivot 28' through mechanisms identical to that shown in FIG. 1.

In FIG. 1, the path of the lower edge of the apron during its hoeing action is traced by arrows shown at 52 and substantially the same hoeing action can be accomplished by the mechanism shown in FIG. 4, all without means which extend rearwardly of the apron.

We claim:

1. Mechanism for assisting loading of a scraper having a bowl with an open forward end and a cutting edge thereat and having hitch means for connecting said forward end of said bowl to a tractor and having means providing for selective raising and lowering of said forward end of said bowl relative to said hitch means, comprising:

- a movable apron member disposed at said forward end of said bowl transversely with respect to the direction of travel of the scraper;
- support linkage extending forward from said apron member to said hitch means for supporting said apron member on said hitch means independently of said bowl and without direct connection thereto, said support linkage being pivotably coupled to said apron member and to said hitch mean to provide for forward and downward movement of said apron member relative to said bowl and relative to said hitch means; and
- powered means connected to said linkage and to said hitch means for selectively providing said apron movement.

2. Mechanism for assisting loading of a scraper having a bowl with an open forward end with a cutting edge thereat and having hitch structure for supporting said forward end of said bowl by means of a tractor in front of said bowl and having means for raising and lowering said bowl relative to said hitch structure and tractor, comprising:

- an apron extending across said forward portion of said bowl without direct attachment thereto,
- a first apron support link member coupled to said apron by a first pivot joint and extending upward therefrom;
- a second apron support link member coupled to said first link member by a second pivot joint situated above said first pivot joint and extending forward therefrom towards said hitch structure and being pivoted to said hitch structure by a third pivot joint, first motor means connected between said apron and said first link member for controlling the inclination of said apron relative to said first link member;
- second motor means connected between said first link member and said second link member for controlling the inclination of said first link member relative to said second link member; and
- third motor means connected between said second link

member and said hitch structure for controlling the inclination of said second link member relative to said hitch structure, whereby said apron may be swung forward and backward and raised and lowered relative to said bowl and relative to said hitch structure to perform a hoeing motion for sweeping material into said bowl and may be positioned immediately above said cutting edge for carrying a load in said bowl.

3. The mechanism defined in claim 2 wherein said second motor means comprises an extensible and contractable jack pivotably coupled to said first link member at a point intermediate between said first and second pivot joints by a fourth pivot joint and extending forward therefrom to said hitch structure and being pivotably coupled to said hitch structure by a fifth pivot joint.

4. The combination defined in claim 3 wherein said fifth pivot joint is spaced rearwardly on said hitch structure from said third pivot joint.

5. The combination defined in claim 2 further comprising a lever having a forward end pivoted to said hitch structure, and an additional link having a forward end pivoted to the back end of said lever and having a back end pivotably connected to said second link member, and wherein said third motor means comprises a fluid-operated jack connected between said lever and said hitch structure.

6. Mechanism for assisting loading of a scraper having a bowl with an open forward end and a cutting edge thereat and having hitch means for connecting said forward end of said bowl to a tractor and having means providing for selective raising and lowering of said forward end of said bowl relative to said hitch means, comprising:

- a movable apron member disposed at said forward end of said bowl transversely with respect to the direction of travel of the scraper;
- support linkage extending forward from said apron member to said hitch means for supporting said apron member on said hitch means independently of said bowl and without direct connection thereto, said support linkage being pivotably coupled to said apron member and to said hitch means to provide for forward and backward and upward and downward movement of said apron member relative to said bowl and relative to said hitch means, the means supporting the apron having upwardly extending members pivoted to the apron, forwardly extending members pivoted to the upwardly extending members and pivot means between the forwardly extending members and the hitch means, and powered means connected to said linkage and to said hitch means for selectively providing said apron movement.

7. The invention of claim 6 with said powered means causing relative movements of said members about all of the pivotal connections.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,574,960 Dated April 13, 1971

Inventor(s) ROBERT A. PETERSON, et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the claims, column 3, line 26, after "forward" add --and backward and upward--.

Signed and sealed this 16th day of November 1971.

(SEAL)  
Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

ROBERT GOTTSCHALK  
Acting Commissioner of Patent