

- [54] **SUSPENSION DEVICE FOR THE BOWL OF A SCRAPER**
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- [30] **Foreign Application Priority Data**  
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37/129
- [51] **Int. Cl.<sup>2</sup>**..... **E02F 3/86**
- [58] **Field of Search**..... 280/492; 37/126 R, 129,  
37/DIG. 9
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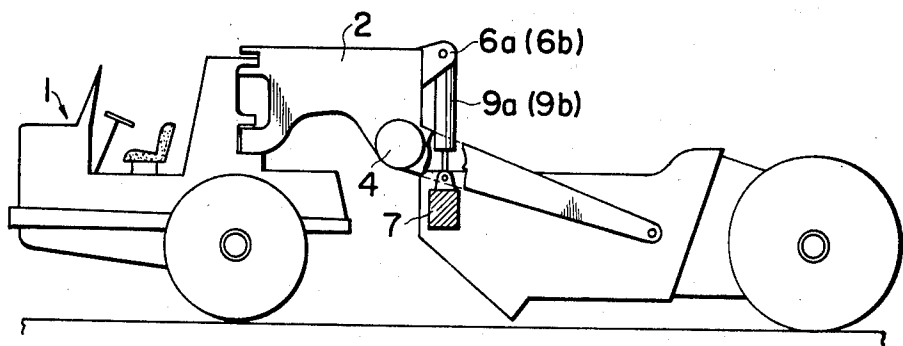
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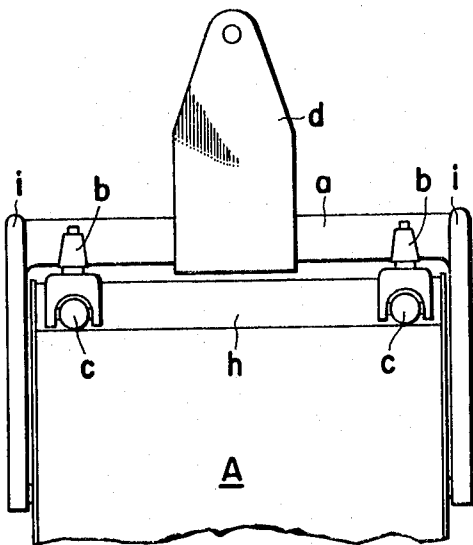
[57] **ABSTRACT**

Suspension device for the bowl of a scraper having draft arms vertically swingably supported by a draft tube attached to a goose neck horizontally swingably mounted on the scraper, the bowl being swingably supported at the free ends of the draft arms. One end of each of a pair of lift cylinder assemblies is arranged at the left and the right side with respect to the center of the scraper body and connected through spherical bushes to the upper rear portion of the goose neck at positions relatively close to each other while the other ends of the lift cylinder assemblies are connected through spherical bushes to a cross member laterally spanning the bowl at positions adjacent to opposite ends of the cross member so that the lift cylinder assemblies extend obliquely permitting the length thereof to be increased so as to improve the stability in the operation of the bowl while the strength of the suspension device is improved.

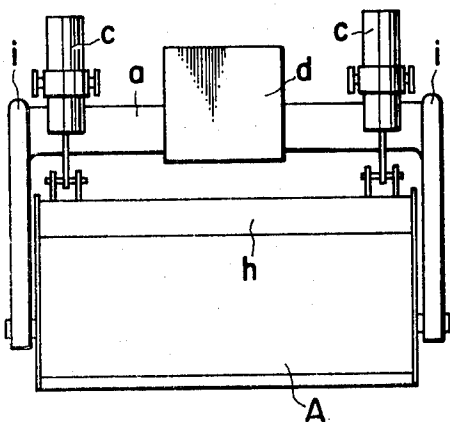
**3 Claims, 9 Drawing Figures**



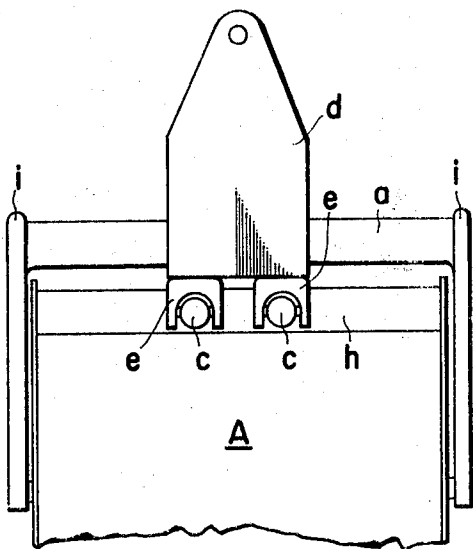
**FIG. 1A**  
**PRIOR ART**



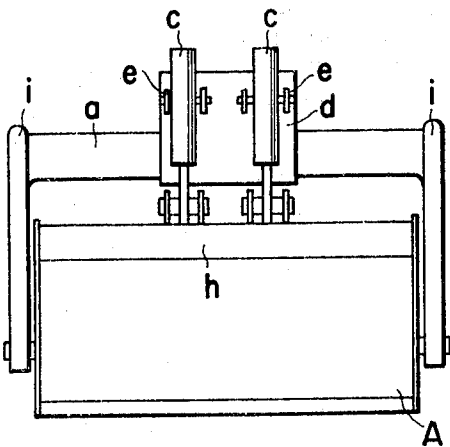
**FIG. 1B**  
**PRIOR ART**



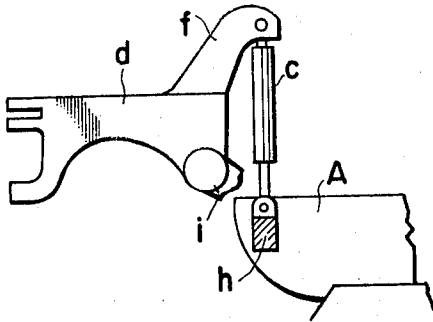
**FIG. 2A**  
**PRIOR ART**



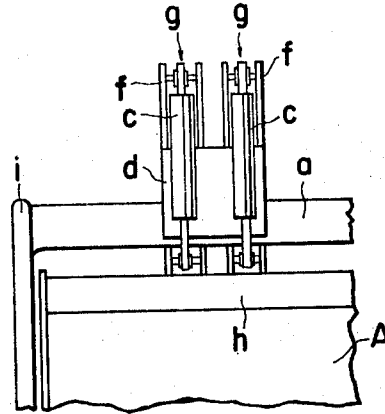
**FIG. 2B**  
**PRIOR ART**



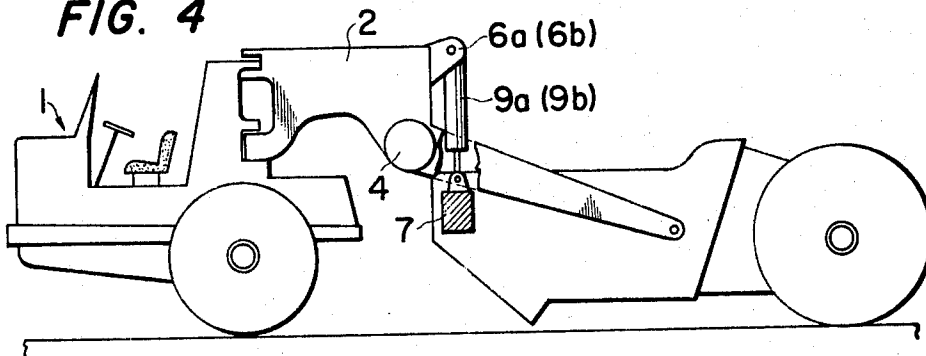
**FIG. 3A**  
**PRIOR ART**



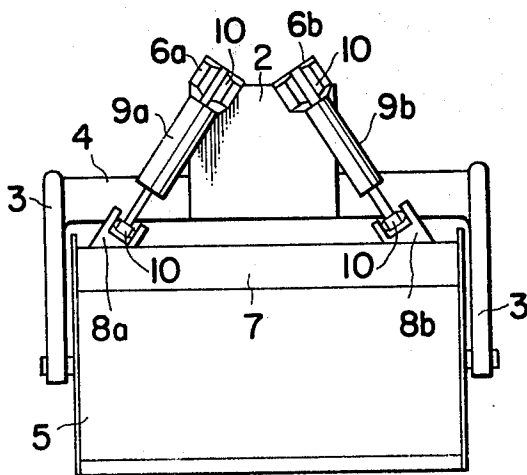
**FIG. 3B**  
**PRIOR ART**



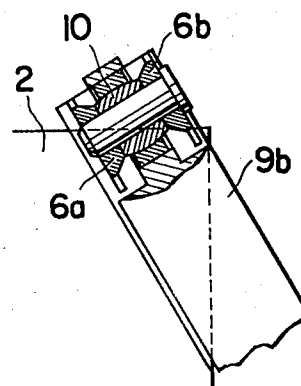
**FIG. 4**



**FIG. 5**



**FIG. 6**



## SUSPENSION DEVICE FOR THE BOWL OF A SCRAPER

### BACKGROUND OF THE INVENTION

The present invention relates to a suspension device for the bowl of a scraper. In general, the prior art teaches various ways in which the bowl of a scraper is connected to a goose neck of the tractor so that it can be lifted and lowered.

One of the prior art connecting means comprises gimbals mounted on the opposite ends of the draft tube of the bowl supported by the goose neck and lift cylinder assemblies which are freely supported by gimbals. The bowl is connected to the scraper body through the lift cylinder assemblies so that the bowl is controlled by the operation of the lift cylinder assemblies. However, such connecting means requires special parts for the gimbals which are heavy and bulky thereby raising the cost while a large space is required for the gimbals. Further since the gimbals are mounted on the draft tube which is subjected to a high twisting stress it is the portions of the draft tube at which the gimbals are secured must therefore be reinforced so as to prevent stress concentration therein. Further, the visibility in the rearward direction is impaired.

Another prior art connecting means comprises trunnions supported by the goose neck which trunnions laterally support the lift cylinder assemblies swingably. However, such connecting means lacks reliability in operation and strength, because no traverse freedom is given to the trunnions in case the bowl moves transversely or is twisted thereby resulting in excess force at the point where the trunnions are mounted on the goose neck. Further, since the lift cylinder assemblies are connected to a cross member spanning transversely the bowl at positions relatively close to the center thereof, the cross member is subjected to a high bending movement thereby impairing its strength.

A further prior art connecting means comprises upstanding support brackets secured to the upper surface of the goose neck. The lift cylinder assemblies are connected to the brackets through spherical bushes, however, such connecting means have the disadvantage that the height of the brackets supporting the lift cylinder assemblies is quite high thereby impairing the strength therefore and detracting from the appearance of the scraper. Further, the greater height of the scraper gives rise to difficult problems in the use of the scraper.

The present invention aims at avoiding the above described disadvantages of the prior art connecting means for the bowl in a scraper.

### SUMMARY OF THE INVENTION

The object of the present invention is to provide a novel and useful suspension device for the bowl of a scraper which eliminates the disadvantages of the prior art scraper suspension device.

The above object is achieved in accordance with the present invention by providing a suspension device for the bowl of a scraper having a goose neck horizontally swingably mounted on the scraper, draft arms vertically swingably supported by the goose neck at their proximal ends, whereby the draft arms are swingably supporting the bowl at their distal ends and a pair of lift cylinder assemblies are arranged at the left and the right side with respect to the center of the scraper body

and connected to brackets on the goose neck and the bowl for controlling the movement of the bowl. The suspension device is characterized in that one end of each of the pair of lift cylinder assemblies are connected through spherical bushes to the brackets positioned at the upper rear portion of the goose neck relatively close to each other and the other ends of the lift cylinder assemblies are connected through spherical bushes to a cross member spanning laterally the bowl at positions adjacent to the opposite ends of the cross member whereby the lift cylinder assemblies extend obliquely.

With the arrangement described above, the stability and strength of the suspension device are insured even where the bowl moves laterally, because the length of the lift cylinder assemblies is increased and the spherical bushes are incorporated in the means connecting the lift cylinder assemblies to the goose neck and the bowl, respectively.

Further, the spherical bushes are easily available in the market thereby making it possible to construct and maintain the suspension device at a lower cost in comparison with the prior art in which gimbals are used.

Further, since the lift cylinder assemblies are connected to the upper rear portion of the goose neck, sufficient strength is given to the suspension device with the minimum number of parts and simple construction.

Still further, the bending movement generated in the cross member is reduced to a minimum by virtue of the supporting points of the lift cylinder assemblies being located on the cross member of the bowl adjacent to the opposite ends thereof so as to dispose the lift cylinder assemblies in obliquely extending state, while the stability of the scraper is improved even when the bowl moves laterally.

Further, the visibility in the rearward direction is improved.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a plan view showing an example of the prior art suspension device for the bowl of a scraper; FIG. 1B is a vertical elevational view of FIG. 1A; FIG. 2A is a plan view showing another example of the prior art suspension device; FIG. 2B is a vertical elevational view of FIG. 2A; FIG. 3A is a side view showing a still further example of the prior art suspension device; FIG. 3B is a vertical elevational view of FIG. 3A; FIG. 4 is a general side view showing an embodiment of the scraper incorporating the suspension device constructed in accordance with the present invention; FIG. 5 is a vertical elevational view of FIG. 4; and FIG. 6 is a fragmentary view in enlarged scale showing a portion of the lift cylinder assembly shown in FIG. 5.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Prior to the description of the present invention, some of the prior art suspension devices will be described for better understanding of the present invention.

Referring to FIGS. 1A and 1B which show an example of the prior art suspension device the gimbals *b* are mounted on the opposite ends of the draft tube *a* swingably supported by the goose neck *d* which is swingably mounted on the scraper (not shown). The draft arms *i* are secured to the draft tube *a* at the opposite ends thereof

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swingably support the bowl A as shown. The gimbals *b* freely support the lift cylinder assemblies *c* as shown, and the lift cylinder assemblies *c* are connected to the cross member *h* of the bowl A so that the movement of the bowl A is controlled by the actuation of the lift cylinder *c*. However, as described previously, such a construction has the disadvantage that special parts are necessary to construct the gimbals *b* thereby raising the cost while, since the gimbals *b* are heavy and bulky a large amount of space is required for arranging the gimbals *b*. Further, and the draft tube *a* is subjected to a high twisting stress rendering it to be unstable so that reinforcement is required to prevent excess stress being concentrated in the draft tube. Further, visibility in the rearward direction is impaired.

Another example of the prior art suspension device is shown in FIGS. 2A and 2B which comprises trunnions *e* secured to the goose neck *d*. The trunnions *e* support lift cylinder assemblies *c* laterally swingably, and the lift cylinder assemblies *c* are connected to the cross member *h* of the bowl A so as to control the movement of the bowl A by the actuation of the lift cylinder assemblies *c*. However, as previously described, this construction has the disadvantage that excess force is generated in the lift cylinder assemblies *c* in case the bowl is moved laterally, because no lateral freedom is given to the lift cylinder assemblies *c*, while very high bending movement is given to the cross member *h*.

A further example of the prior art suspension device is shown in FIGS. 3A and 3B which comprises upstanding support brackets *f* secured to the upper surface of the goose neck *d*, and lift cylinder assemblies *c* are connected between the brackets *f* and the cross member *h* of the bowl A as shown so that the movement of the bowl A is controlled by the actuation of the lift cylinder assemblies *c*. As described previously, this construction has the disadvantage that the supporting points of the brackets *f* is made elevated so that the strength as well as the appearance is impaired, and the height of the scraper is unreasonably high.

Now, a preferred embodiment of the present invention eliminating the above described disadvantages will be described below with reference to FIGS. 4 to 6.

As shown in the drawings, the goose neck 2 is horizontally swingably mounted on the tractor 1 and the draft arms 3 are vertically swingably mounted on the goose neck 2 by the draft tube 4 as shown. The bowl 5 is swingably mounted on the free ends of the draft arms 3.

In accordance with the characteristic feature of the present invention, brackets 6a, 6b are secured to the upper rear end of the goose neck 2 in positions relatively close to each other at the left and right sides respectively with respect to the center of the goose neck 2. One end of each of the lift cylinder assemblies 9a, 9b are connected respectively to the brackets 6a, 6b

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through spherical bushes 10, respectively, as best shown in FIGS. 5 and 6, while the other ends of the lift cylinder assemblies 9a, 9b are connected through spherical bushes 10 to brackets 8a, 8b secured to the cross member 7 of the bowl 5 adjacent to the opposite ends thereof, respectively, as shown in FIG. 5. Thus, the lift cylinder assemblies 9a, 9b extend obliquely thereby permitting the length thereof to be increased so that the supporting action of the bowl 5 is improved.

The brackets 6a, 6b and the cross member 7 are shown as being vertically aligned. However, the cross member 7 may be located forwardly or rearwardly of the brackets 6a, 6b in the longitudinal direction of the tractor 1 beneath the brackets 6a, 6b so that the lift cylinder assemblies 9a, 9b extend obliquely forward or rearward, or obliquely forwardly and laterally or rearwardly and laterally, thereby permitting the length of the lift cylinder assemblies 9a, 9b, to be further increased facilitating the provision of the spherical bushes 10 and increasing the stability of the operation of the bowl.

As described previously, the above construction also makes it possible to lower the production and maintenance cost with the minimum number of parts easily available and to improve the visibility in the rearward direction while sufficient strength is given without additional reinforcement heretofore required in the prior art suspension device.

We claim:

1. In a suspension device for the bowl of a scraper having a goose neck horizontally swingably mounted on the scraper, draft arms vertically swingably supported by said goose neck at their proximal ends, said draft arms swingably supporting said bowl at their distal ends, and a pair of lift cylinder assemblies arranged at the left and the right side with respect to the center of the scraper body and connected to said goose neck and said bowl, respectively, for controlling the operation of said bowl, the improvement wherein one ends of said pair of lift cylinder assemblies are connected through spherical bushes to the upper rear portion of said goose neck at positions relatively close each other and the other ends of said lift cylinder assemblies are connected through spherical bushes to a cross member spanning laterally said bowl at positions adjacent to the opposite ends of said cross member whereby said lift cylinder assemblies extend obliquely.

2. The suspension device of claim 1, wherein said cross member is disposed at a position forward of said upper rear portion of the goose neck where the lift cylinders are connected.

3. The suspension device of claim 1 wherein said cross member is disposed at a position rearward of said upper rear portion of the goose neck where the lift cylinders are connected.

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