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Hornagold

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[54] **OUTRIGGER FLOAT MOUNTING**

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[52] **U.S. Cl.** **280/150.5**; 212/145

[51] **Int. Cl.** **B60s 9/10**

[58] **Field of Search** 280/150.5; 212/145; 214/141

[56] **References Cited**

UNITED STATES PATENTS

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[57] **ABSTRACT**

An extensible outrigger arrangement of the type where the float is pivotally mounted on the rod of the vertical cylinder and cammed to a vertical storage position upon retraction is provided with cam plates pivotal coaxially with the float. A pair of torsion springs between the cam plates and float maintain the parts in normal relative positions, but allow the float to pivot should an obstruction be encountered when the outrigger beam is extended while the float is in its vertical position.

4 Claims, 5 Drawing Figures

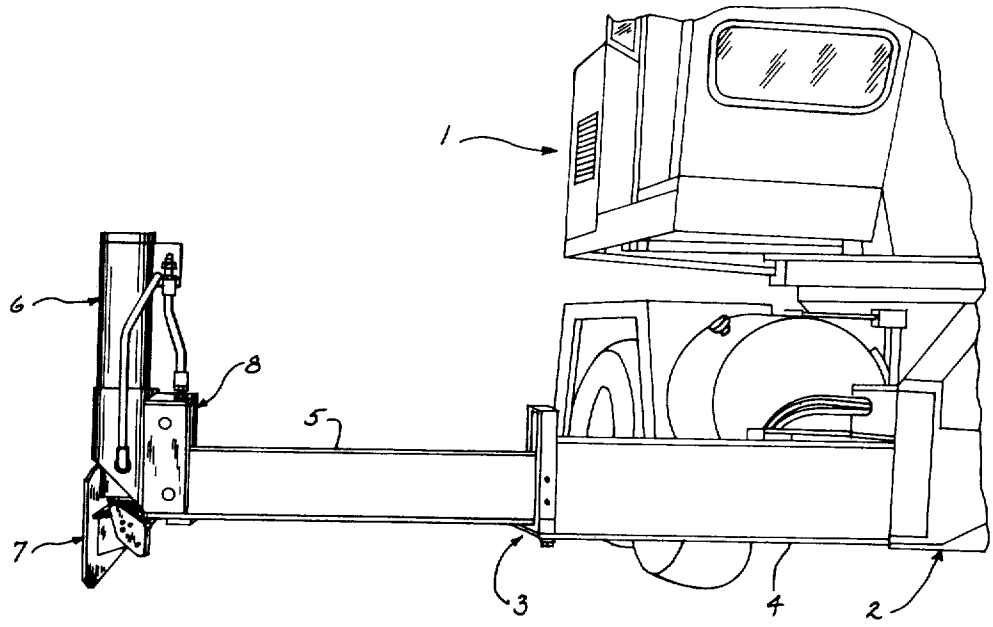
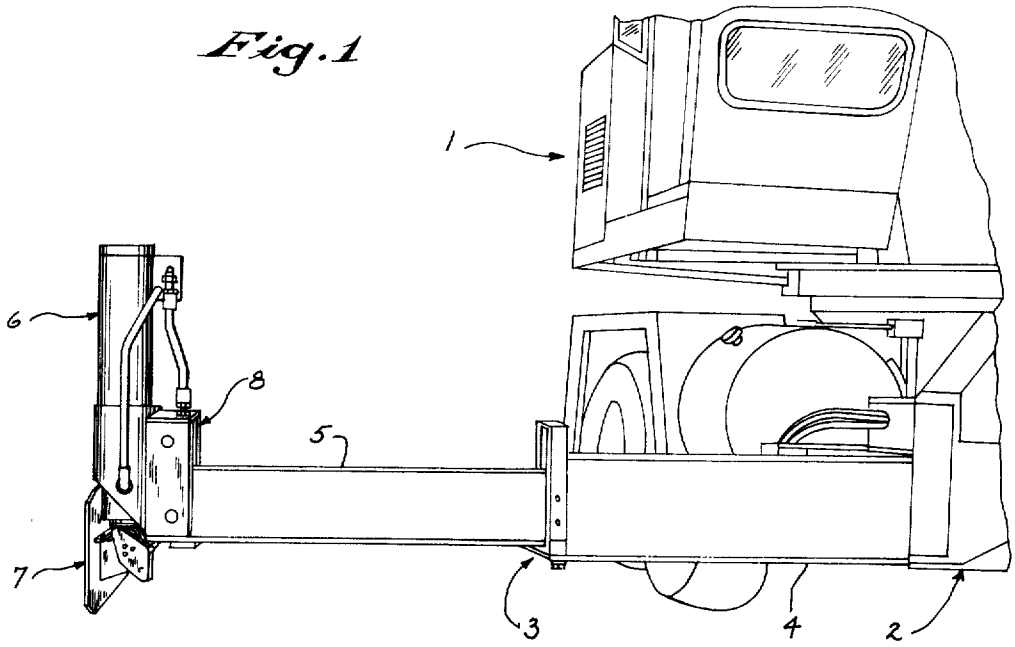


Fig. 1



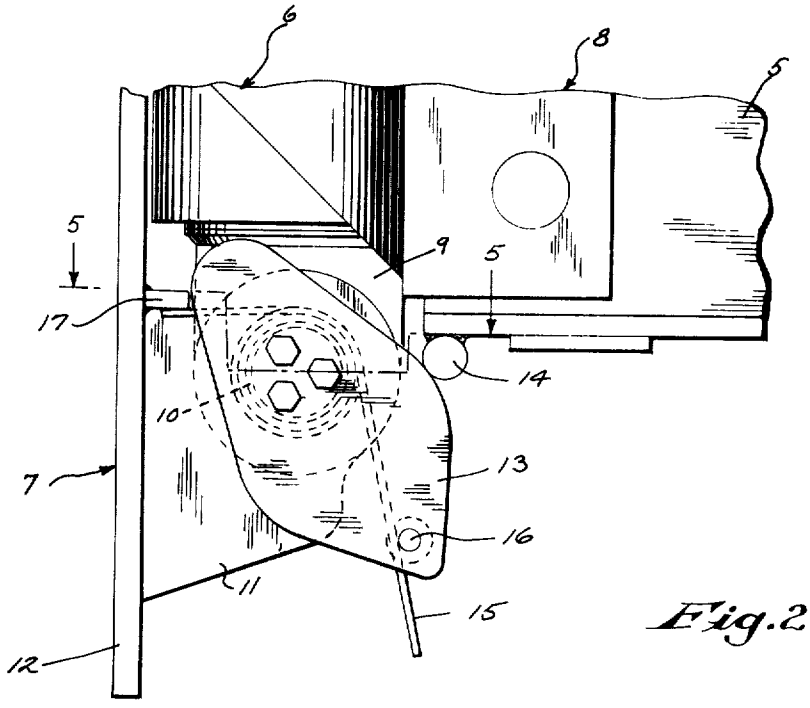


Fig. 2

Fig. 3

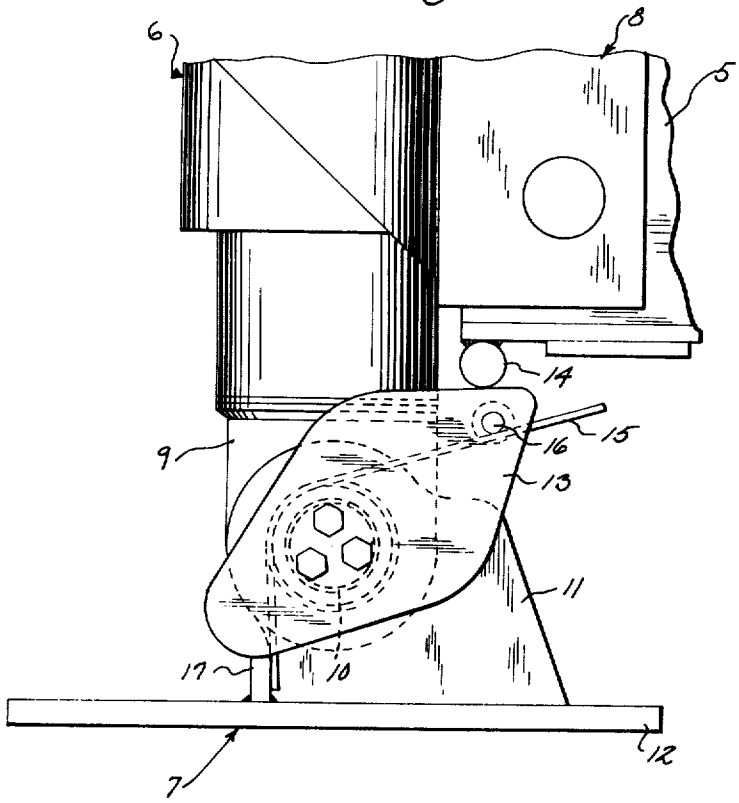
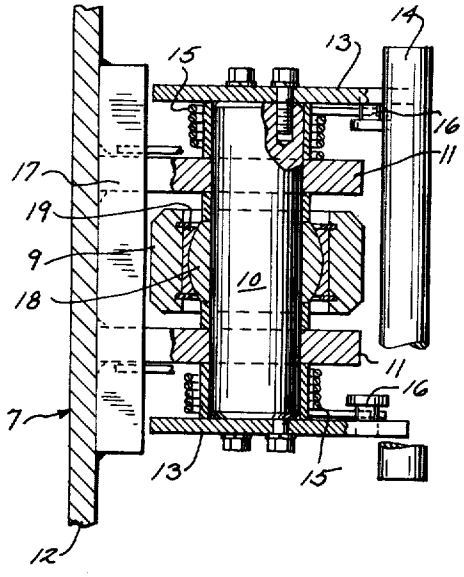


Fig. 5



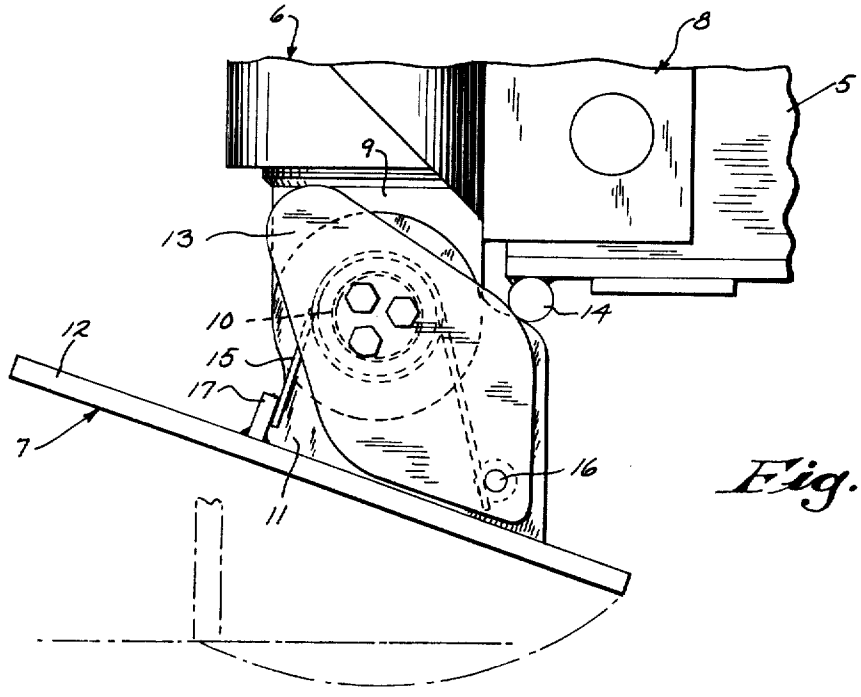


Fig. 4

OUTRIGGER FLOAT MOUNTING

BACKGROUND OF THE INVENTION

This invention relates to extensible outriggers for truck cranes and the like, and more particularly to outriggers with self-storing floats of the type shown in the copending application of John T. Hornagold, Ser. No. **412,374,** filed Nov. **1, 1973** for "Mounting for Vertical Outrigger Cylinder."

Truck cranes and similar machines are commonly provided with outriggers comprising extensible and retractable horizontal beams and vertical cylinders mounted on the ends of the beams and provided with ground engaging floats. When the floats are in their horizontal working positions they extend laterally substantially beyond the vertical cylinders; and, particularly for truck cranes where travel width is a serious problem, it is desirable to have some means for moving the floats to retracted or stored positions — it would of course be possible to remove the floats entirely, but this can be very difficult and time consuming, particularly for large machines with heavy floats. In the aforementioned application Ser. No. **412,374,** to which reference may be had for further description, the problem is solved by providing a camming mechanism which causes the float to pivot to a vertical stored position alongside the vertical cylinder when the rod of the vertical cylinder is retracted.

The noted arrangement is highly satisfactory, but it does present a problem in that, when the floats are in vertical position they may extend substantially below the vertical cylinder and the beam. When a machine is being set up, the beam is usually at least partially extended before the rod of the vertical cylinder is extended, and it is entirely possible that the lower edge of the float will run against the ground or some obstruction during this movement. Because of the camming arrangement, the float is necessarily in direct contact with the remainder of the assembly, and running against any obstacle can cause twisting forces which can result in serious structural damage.

SUMMARY OF THE INVENTION

The present invention contemplates an improved outrigger float mounting arrangement in which the foregoing problem is overcome by, in effect, making the cam portion of the float relatively movable with respect to the float proper and providing resilient means that normally holds the respective parts in working position but that can be overridden to allow the float to pivot and ride over obstructions and then return to stored position. In the preferred embodiment, this is accomplished by providing cam plates which are pivotally mounted coaxially with the pivotable float and torsion springs effectively interposed between the cam plates and the float proper. This permits relative movement between the float and cam plates if an obstruction is encountered, but once the float has moved over the obstruction, the springs will automatically cause the parts to return to their normal relative positions. The arrangement of the invention is highly effective and durable, but is also relatively inexpensive and easy to manufacture, assemble, maintain and use.

Other objects and advantages will appear from the description to follow.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a partial schematic view of a truck crane having outriggers incorporating the float mounting arrangement of the invention;

FIG. **2** is a fragmentary side view of a single outrigger of the machine of FIG. **1,** showing the float in stored position;

FIG. **3** is a fragmentary side view similar to FIG. **2,** but showing the float in horizontal working position;

FIG. **4** is a fragmentary side view similar to FIG. **2,** but showing the float pivoted to an intermediate position that might be assumed in passing over an obstacle; and

FIG. **5** is a view in cross-section, partially broken away, through the plane **5—5** shown in FIG. **2.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. **1,** the reference numeral **1** designates generally a conventional truck crane with a wheeled carrier and revolving upper works. While the invention is particularly satisfactory for such machines, however, it should be understood that it is applicable to any construction or excavating machine or other machine or equipment of any type where outriggers are provided.

The outrigger assembly includes a transverse box housing **2** which is connected in conventional fashion to the underside of the carrier frame. As is usual, the housing is dual, comprising two adjacent and parallel sections, one for a beam extending to one side of the machine and the other for an oppositely extending beam, and there are two such dual outrigger assemblies, one toward the front and one near the rear of the carrier. For the sake of simplicity only one beam and vertical cylinder are shown in detail, but the other three outriggers are the same.

The outrigger assembly includes a horizontally disposed outrigger beam assembly **3** which is extensibly and retractably received in the associated section of the housing **2** and in the preferred embodiment comprises two telescoping sections, an inner beam **4** and an outer beam **5,** which are actuated by a hydraulic cylinder (not shown). A double acting, hydraulic, vertical cylinder **6** carries a self-storing float **7** and is connected to the outer beam by means of a two-pin mounting arrangement designated generally by the reference numeral **8.** Further disclosure of the mounting arrangement can be had by reference to the application of Hornagold, Ser. No. **412,374,** filed on Nov. **1, 1973.** The present invention, of course, does not necessitate the use of this particular mounting arrangement which is shown for illustrative purposes only. While a two section beam is shown, the invention is equally applicable to outrigger assemblies with single section beams or beams with more than two sections.

As previously indicated, the float **7** is self-storing; and it is shown in its stored position and its horizontal working position in FIGS. **2** and **3,** respectively. The float **7** is pivotally connected to the rod **9** of the cylinder **6** by means of a pin **10** which is pivotally received transversely through the bifurcated outer end of the rod **9** and extends transversely pivotally through a bifurcated mounting bracket **11** fixed to the top surface of the float pad **12.** A pair of parallel plates **13** which serve as cam follower means are bolted to the pin **10** to be

pivotable coaxially with the float 7. The cam plates 13 are engageable with a bar camming member 14 which is fixed to the end of the outer beam section 5 of the horizontal cylinder. A pair of torsion springs 15 are wound around the pin 10. Each spring 15 has one end trapped by a stop 16 on a respective one of the cam plates 13 and its other end trapped by an upstanding stop bar 17 fixed to and extending substantially across the pad 12.

The float 7 is pivotal with respect to the rod 9 by virtue of the bracket 11 being mounted on the pin 10, the pin 10 defining an axis of rotation that is generally parallel to the length of the machine 1 and horizontally transverse to the line of movement of the beam 3 during extension and retraction. The cam plates 13 are pivotable about the same axis; in the preferred embodiment this is accomplished by fixing them to the pivotable pin 10, but they could be pivotably mounted. The float 7 and plates 13 are also coaxially pivotable with respect to one another, but are normally held in relative working positions, as seen best in FIG. 3, by the springs 15 which move them in opposite directions; referring to FIG. 3, the float 7 is moved in a clockwise direction and the plates 13 are moved in a counterclockwise direction. Relative pivotal movement in this fashion is limited by engagement of the plates 13 with the stop 17, as seen in FIG. 3.

During working the float 7 will be in the position shown in FIG. 3, except that the rod 9 will have been extended further so that the pad 12 engages the ground. When the machine is to be moved, the rod 9 is retracted and the float moves to the position shown in FIG. 3, at which point the edges of the cam plates 13 come into contact with the camming member 14. Further retraction of the rod 9 will cause the edges of the plates 13, which are appropriately contoured, to ride along the bar 14 so that the entire float assembly, including the cam plates 13, pivots clockwise to the stored position shown in FIG. 2 where the pad 12 is vertical and alongside the outer side of the cylinder 6; the springs 15 hold the float 7 and plates 13 in their normal relative positions during this movement. With the float assembly in this stored position the overall width of the outrigger assembly is reduced significantly, this feature being particularly desirable for large machines with large floats.

It is desirable to allow the float limited movement in all directions to allow compensation for minor ground irregularities, and a generally conventional ball bushing arrangement is preferred. As can be seen in FIG. 5, a ball member 18 is fitted on the pin 10, and the outer end of the rod 9 is bifurcated to receive a socket member 19.

In operation, the beam assembly 3 is usually first extended, at least partially, and the rod 9 is then extended so that the pad 12 engages the ground, the float 7 being freed to assume its working position as the rod 9 extends. For travel to another site, the rod 9 is usually retracted first, which moves the float 7 to its stored position, and the beam assembly 3 is then retracted.

It is when the beam 3 is being extended for setup with the float 7 vertical that the relative movement allowed between the float 7 and plates 13 becomes important. That is, the pad 12 extends substantially below the cylinder 6 and beam 3 when it is in stored position, and should the machine have settled as the result of being on soft ground, or if there are any other obstacles to the side of the machine, it is likely that the lower edge of the pad 12 will come against the obstacle. Absent the allowed relative movement, the resulting twisting forces would be transmitted directly to the cylinder 6 and/or the cam member 14, which could result in serious damage or breakage. With the mounting of this invention, however, the entire float 7 is able to pivot, temporarily overriding the springs 15, to the intermediate position shown in FIG. 4, as the result of which it can ride over the obstacle. As soon as the pad 12 is past the obstacle, however, the springs 15 will automatically cause the parts to return to their normal relative positions.

Relative pivotal movement of the float 7 and plates 13 is limited by engagement of the plates with the pad as seen in FIG. 4, but it is possible with the arrangement of the invention to provide several inches or more of additional clearance capability which is sufficient to prevent damage in almost all situations — should there be higher obstacles, they will be visible to the operator so that the situation can be remedied prior to extension of the beam 3. Thus, the invention provides a relatively simple but highly effective way of overcoming a common and serious problem.

The preferred embodiment shown and described provides all of the features and advantages discussed above, but noted and other variations are possible without departure from the spirit of the invention. The invention is not, therefore, intended to be limited by the showing or description herein, or in any other manner, except insofar as may specifically be required.

I claim:

1. In an extensible outrigger assembly comprising an extensible horizontal beam, a vertical cylinder mounted on the outer end of the beam that has a downwardly extensible and upwardly retractable rod, a float pivotally mounted on the outer end of the rod to be movable between a horizontal working position and a vertical stored position alongside the vertical cylinder, a camming member mounted on the outrigger assembly near the vertical cylinder rod, and a cam follower mounted on the float that engages the camming member upon retraction of the rod to cause the float to pivot from working to stored position the improvement wherein:

the cam follower is relatively movably mounted on the float; and there is a resilient connection between the float and cam follower which normally holds the float and cam follower in normal relative positions but which can be overridden to allow the float to pivot from its stored position toward its working position so that it can ride over an obstacle encountered when the beam is extended with the float in stored position, the resilient connection serving to return the float and cam follower to their normal relative positions after the obstacle has been passed.

2. An outrigger assembly according to claim 1, wherein: there is a mounting pin extending through the outer end of the rod horizontally transverse to the line of movement of the beam during extension thereof; and the float includes an upwardly extending mounting bracket that is mounted on the pin; and the cam follower comprises a cam plate that is mounted on the pin and that has a contoured edge that is engageable with the camming member, the float and cam plate being

pivotable with respect to the rod and with respect to each other about an axis defined by the pin.

3. An outrigger assembly according to claim 2, wherein: the resilient connection comprises a torsion spring that is wound around the pin with its ends operatively engaged, respectively, with the float and cam plate, the torsion spring normally serving to pivot the float and cam follower in opposite directions toward their normal relative positions.

4. An outrigger assembly according to claim 3 wherein: one end of the spring is engaged against an upstanding stop on the float, the cam plate being engageable with the stop to limit the opposite pivotal movement provided by the torsion spring.

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