





## AN EXCAVATOR WITH A DRAGLINE EQUIPMENT

### BACKGROUND OF THE INVENTION

The invention relates to working equipment having singlebucket excavators, and more particularly to the design for the draglines of said excavators whose working equipment is operated and controlled hydraulically.

### PRIOR ART

Known in the art are draglines of a design featuring rope drums for the dragging and hoisting a bucket, a boom and a boom-luffing mechanism with hydraulic cylinders mounted on the turntable of an excavator, with said components being interlinked by guide sheaves and ropes.

One of the known draglines has a boom defined by two sections interconnected by pins and tie rods. The lower boom section is attached to the turntable of an excavator and receives support at its upper end from piston rods of hydraulic cylinders mounted on the turntable. Two rope drums are disposed on the same boom section and serve to impart motion to a bucket and also having guide sheaves over which ropes are passed. The high dead weight of the rope drums arranged on the boom at a considerable height above the ground and forward with respect to the edge about which the excavator is likely to overturn adds to the leverage of the machine, and, consequently, impairs the rate of its work, with the bucket not being filled to its full capacity.

Furthermore, the guide sheaves of the drag rope are disposed at the foot of the boom so that the rope is bent towards the drum through an angle in excess of 90°. This increases the resistance offered to the rope as it passes over the sheaves and reduces the speed at which the bucket is lowered into the face, with the rate of work also being impaired in this case.

In another known dragline, the boom-luffing mechanism actuated by hydraulic cylinders features three pivotal arrangements serving to secure said mechanism to the turntable of an excavator instead of only two pivots which are used to secure the boom and boom-luffing hydraulic cylinders on other excavators.

This makes the boom-luffing mechanism too complicated and unsuitable for use on excavators of other makes.

Another point to be noted is that in order to set the boom into an intermediate working position the components of said mechanism are to be turned in a vertical plane through an angle as wide as 90°. This necessitates much space on the turntable of the excavator and invites difficulties in installing the rope drums and other assemblies.

### OBJECTS AND SUMMARY OF THE INVENTION

The object of the invention is to provide a dragline in which the problem of disposing the rope drums for imparting motion to the bucket of an excavator and also to the hydraulic cylinders of the boom-luffing mechanism is solved so as to be able to adapt said luffing mechanism for use on excavators of various make and also to increase substantially the rate of work of the excavator by improving its stability and increasing the bucket capacity.

The above other objects are attained by the fact that in a dragline comprising a boom secured to the turntable

of an excavator so as to be capable of luffing in a vertical plane with the aid of hydraulic cylinders, and having a bucket operated by means of rope drums, with the hydraulic cylinders being pivotally mounted, in accordance with the invention, on a boom close to its foot pin and on the turntable of excavator and further provided with a pivotally mounted frame capable of turning in a vertical plane and being movably attached to the boom, and with piston rods of the hydraulic cylinders being connected to the frame and with the rope drums operating the bucket being mounted on said frame.

The essence of the invention disclosed herein consists in the following.

Since the hydraulic cylinders of the dragline pivotally bear upon the boom at its foot while the piston rods of said cylinders are connected to the frame carrying the rope drums, any luffing of the boom or turning of the frame in a vertical plane due to the action of said piston rods moving either inwardly or outwardly is accompanied by some travel of the hydraulic cylinders taking place in the same direction as the boom. The fact that the piston stroke or movement is addable with the amount of cylinder travel is conducive to an increase in the turn angle of the frame and the luffing of the boom while the overall dimensions of the hydraulic cylinders and frame are reduced by 8 to 10 percent, maintaining, however, the requisite length and luff of the boom.

Thanks to the fact that the hoisting of the boom into the working position causes the frame with rope drums to turn towards the counterweight of the excavator so that the center of gravity of the rope drums moves away from the boom by a corresponding amount, with the leverage of excavator being reduced and a higher rate of work being attainable by employing a bucket with a greater capacity. Moreover, the fact that the rope drums of dragline are disposed on the frame pivotally connected to the turntable of the excavator makes said drums a self-contained unit capable of being removed from the excavator with ease and capable of being fitted on practically any excavator. The dragline disclosed herein is a multi-purpose machine being mounted on the turntable with the aid of two pivotal arrangements which are available on every excavator.

### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be best understood from the following description of its preferred embodiment when read in conjunction with the accompanying drawing in which the sole FIGURE is a side elevation view.

### DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing, the dragline for a hydraulically driven excavator has a boom 1 attached to a turntable 2 of the excavator having a provision for luffing in a vertical plane by means of a pivotal arrangement 3. Secured to the same turntable 2 there is a frame 4 capable of turning in a vertical plane with the aid of a pivotal arrangement 5. Said frame 4 bears upon piston rods 7 having hydraulic cylinders 8 with its upper end connected to said piston rods by a fulcrum pin 6. The hydraulic cylinders 8, in turn, are secured to brackets 9 of the boom 1 by means of fulcrum pins 10. The brackets 9 are disposed close to the foot pin of the boom 1.

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Rope drums 11 & 12 are mounted on the frame 4, and using corresponding bearings (not shown), whereas on the fulcrum pin 6 a derricking sheave 13 is arranged passing over which is a derricking rope 14 whose ends are connected to a point pin 15 of the boom 1 so that the frame 4 is movably linked with the boom.

Close to the foot pin of the boom 1 there is provided a fairlead 16 having rollers and sheaves serving to guide a drag rope 18 between the rope drum 11 and a bucket 17.

A hoist rope is wound on the rope drum 12 which passes over a point sheave 20 of the boom 1 and is connected to a suspension 21 for the bucket 17. In order to hold the bucket in the position as required, a rope 23 is secured to an arch 22, passing over a sheave 24 of the suspension 21 and held fast to the drag rope 18 with aid of a fastener 25.

The dragline disclosed herein operates as follows. When preparing an excavation job, the boom is luffed upwards, and the frame with the rope drums are raised into the working position as required. This is accomplished by the piston rods 7 which are moved outwardly from the hydraulic cylinders so as to turn the frame 4 about the pivots 5 and to exert a pull on the derricking rope 14, the latter raising the boom by turning it about the pivot 3. For lowering the frame with the rope drums and the boom, the piston rods must be drawn into the hydraulic cylinders. The boom and frame with rope drums are fixed in the working position by locking the hydraulic cylinders.

In order to lower the bucket into the excavation, it is filled with earth by setting the rope drum 11 into operation. The drag rope 18 winding on the drum pulls the

bucket so as to cause the bucket to bite into the ground until it is full.

The filled bucket 17 is then lifted by winding the drag rope 18 simultaneously with the hoist rope 19.

In order to move the bucket 17 along the boom towards the point of dumping, the hoist rope 19 is made taut while the drag rope is slackened. The discharge of earth is accomplished when the hoist rope 19 is stopped while the drag rope 18 is being paid out so as to enable the bucket to overturn due to gravity. After the dumping process, the bucket 17 is returned back into the excavation and the dragline working cycle of is repeated.

As will be noted from the above, the dragline disclosed herein can be mounted effortless and readily on practically any excavator. Furthermore, an excavator equipped with such a dragline displays an improved stability and is capable of employing a high-capacity bucket with the result being that its rate of work will increase by up to 10 percent.

What is claimed is:

1. A dragline excavator comprising a boom pivotally mounted to a turntable of said excavator; hydraulic cylinders serving the purpose of luffing said boom in a vertical plane, said cylinders being pivotally attached to said boom closely adjacent to the pivotal mounting of said boom to said turntable; a frame pivotally mounted on the turntable of the excavator for pivotal movement of the same in a vertical plane, the piston rods of said cylinders being connected to said frame at an upper part thereof; said excavator including a dragline bucket and rope drums disposed on said frame to operate said bucket.

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