Dec. 6, 1960 J. L. ROE 2,962,822

MINE DREDGER

Filed Nov. 28, 1956

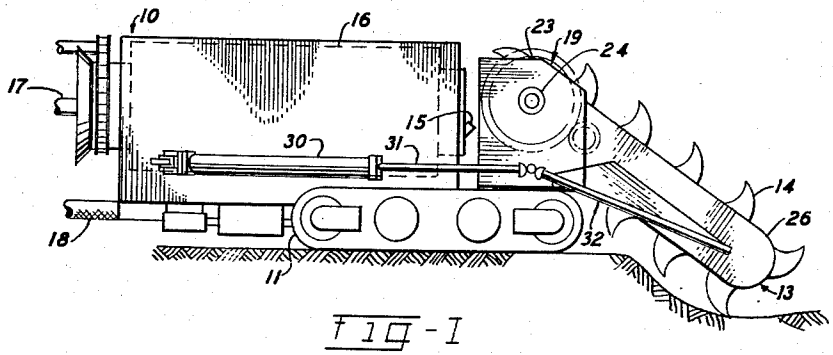


Fig-1

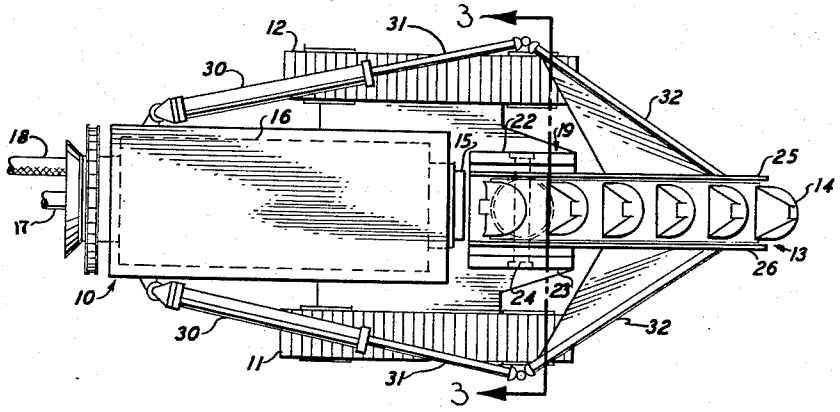


Fig-2

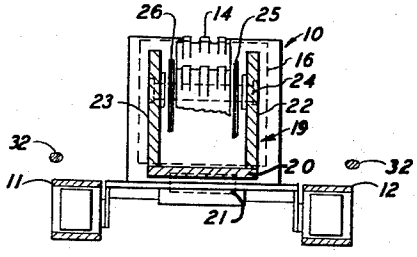


Fig 3

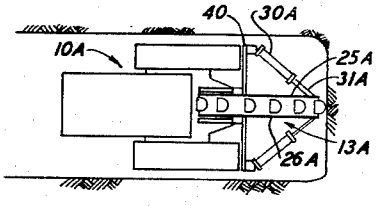


Fig-4

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MINE DREDGER

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1 Claim. (Cl. 37—191)

The present invention relates to dredgers and more particularly to mine dredgers of the type disclosed in my Patent No. 2,597,036 for "Endless Digger Type Mine Dredger."

In the referred-to type of dredger, a boom at the forward end of the machine supports an endless line of excavating buckets. The boom is supported for vertical and/or horizontal swinging movement so that tunnels of dimensions sufficient to pass the entire machine can be excavated. To facilitate a tunneling operation, the bucket line-supporting boom must be readily manipulated and the overall height and width of the machine should be kept at a minimum to expedite progress of the excavation.

Generally, it is an object of the present invention to provide an improved dredger of the type referred to for effecting the rapid excavation of tunnels.

It is a feature of the invention to provide an improved, simplified boom-swinging arrangement for a dredger whereby cost is lessened but effectiveness is enhanced.

A further feature relates to the design of the machine which minimizes its transverse dimensions whereby passage thereof through the excavated tunnel is facilitated.

These and other objects and features of the invention will become more apparent from a perusal of the following description of the embodiments of the invention illustrated in the accompanying drawing wherein:

Fig. 1 is a side elevation of a preferred embodiment of the invention, the device being illustrated in an excavating operation,

Fig. 2 is a top plan view of the device,

Fig. 3 is a sectional view taken along line 3—3 of Fig. 2 to illustrate details of the support arrangement for the boom of the dredger, and

Fig. 4 is a top plan view of a dredger constituting a modified embodiment of the invention.

With particular reference to Figs. 1, 2, and 3, the embodiment of the invention therein shown generally includes a tractor consisting of a relatively rigid frame structure **10** mounted for movement on a spaced pair of endless chains **11, 12**. At the forward end of the tractor frame **10** is mounted a boom **13** which carries an endless line of excavating buckets **14**, such boom being capable of swinging movement about horizontal and vertical axes so that the excavating buckets **14** can be brought into engagement with the material to be removed at various selected horizontal and vertical positions. The excavated material is dumped from the buckets **14** into a trough **15** which directs the material into a trommel in the form of a perforated drum **16** arranged to separate the material according to particle size. Material of relatively large particle size passes longitudinally through the trommel **16** to be discharged from the rear end thereof while those of smaller size pass through the perforated openings of the trommel together with water supplied through an inlet pipe **17** to thereafter be carried with the water for discharge through an outlet hose **18** for delivery to a desired location.

The tractor frame **10** and the endless chains **11, 12** are of more or less conventional design and consequently will not be described in detail. However, it will be understood that a relatively rugged structural arrangement is desired since relatively great forces are exerted thereon during a dredging or tunneling operation.

In order to mount the referred-to boom **13** for the desired pivoting thereof, while retaining also a desired ruggedness in its mounting, a yoke structure **19** is provided in accordance with the present invention. As can best be seen in Fig. 3, the base **20** of the yoke **19** is supported for rotation about substantially a vertical axis at the forward end of the tractor frame **10** midway of the pair of endless chains **11, 12**. To insure the desired ruggedness, a large bearing structure **21** is provided, but it will be clearly understood that any bearing structure of known design having the required ruggedness can be employed. Between the upstanding, spaced legs **22, 23** of the yoke **19**, a shaft **24** is supported so as to extend transversely relative to the described vertical axis of yoke rotation. One end of the boom **13** is pivotally supported by this shaft **24** to provide for vertical swinging movement of the boom; and as will be understood, the horizontal swinging of the boom **13** will be enabled by the rotation of the boom-supporting yoke **19** about the aforementioned vertical axis.

The boom **13** consists of spaced side plates **25, 26** between which the line of excavating buckets **14** is supported for continuous movement. For details of the bucket line structure and the manner of actuating movement thereof, reference is made to my aforementioned Patent No. 2,597,036.

In order to actuate the horizontal and vertical swinging movement of the boom **12**, there is provided in accordance with the present invention, a simplified boom-actuating arrangement. Generally, such arrangement includes a pair of expansible members connected between the tractor frame **10** and the boom **13** on opposite sides of the vertical axis of rotation of the boom-supporting yoke **19** and under the horizontal axis defined by the shaft **24** to which the boom **13** is mounted and about which it may pivot. Each expansible member is swivelly connected at its opposite ends to the frame and to the boom to provide a universal joint at each position whereby a requisite change in its disposition can occur as the boom is swung relative to the supporting frame.

As shown in Figs. 1 and 2, each expansible member takes the form of a hydraulic cylinder **30** together with an associated piston rod **31**. One end of the cylinder **30** is swivelled to the side of the frame **10** towards the rear end thereof, and the end of the piston rod **31** remote from the cylinder **30** is in turn swivelled to the rearmost extremity of an arm **32** that is rigidly attached to the side plate **25** or **26** of the boom **13**. Dependent upon the application of fluid into the hydraulic cylinder **30**, the piston rod **31** is caused to withdraw into the cylinder or to move outwardly therefrom to thereby effect a variation in the distance between the described swivel connections. Simultaneous inward or outward displacement of the piston rods **31** on both sides of the frame **10** will effect swinging of the boom **13** in a vertical plane, while, on the other hand, if one rod is expanded while the other is withdrawn, a transverse or horizontal swinging of the boom **13** will be effected. In order to actuate the desired movement of the piston rods **31**, a suitable hydraulic system such as shown in my aforementioned patent can be utilized.

The aforementioned trommel **16** to which the material is delivered by the buckets **14** on the described boom **13** forms no part of the present invention and for a detailed description of its structure and operation, reference is again made to my Patent No. 2,597,036. It should be particularly noted, however, that the portion

of the frame **10** wherein such trommel is housed is at a relatively low level so that its top is below the level reached by each bucket **14** at the mounting end of the boom **13**. Thus, any tunnel of sufficient dimension to permit the passage of the boom **13** and bucket line thereon will also accommodate the remaining structure of the machine. It may also be appropriate to note, at this point, that the transverse supporting shaft **24** of the boom **13** is preferably disposed, as shown best in Fig. 3, adjacent the upper extremities of the upright legs **22**, **23** of the yoke **19** wherefore the bucket line is disposed at a level above any of its supporting structure.

It will be understood impliedly from the foregoing description that various changes in the described structure can be made without departing from the scope of the present invention. As an example, there is shown, somewhat diagrammatically in Fig. 4, a modified structural arrangement for effecting the swinging movement of the boom. As there shown, a conjoined piston rod **31***a* and cylinder **30***a* is swivelly connected between each side plate **25***a*, **26***a* of the boom **13***a* and the end of a transversely extending bar **40** mounted rigidly at the forward end of the frame **10***a*. As in the previously described embodiment of the invention, such an arrangement again involves the provision of but a single expansible member connected between the frame **10***a* and the boom **13***a* on each side thereof; and again, this simple arrangement not only enhances the actuation of the boom, but also reduces cost and the necessity for frequent repair which are encountered in more complex structures.

Various other modifications and/or alterations can also be made without departing from the scope of the invention. Accordingly, the foregoing description of two embodiments is to be considered as purely exemplary and not in a limiting sense, and the scope of the invention is to be indicated by the appended claim.

What is claimed is:

A dredger which comprises a tractor having a frame mounted for movement on a spaced pair of endless chains, a boom having a pair of side plates and mounted at one end on said frame between said chains for vertical and horizontal swinging movement, expansible members swivelly connected at one end to the opposite sides of said frame above said chains, and an arm on each side plate of said boom swivelly connected at its extremity to a respective one of said expansible members at a position above a respective one of said chains, said expansible members extending angularly outward from said frame when said boom is disposed in substantial alignment with said frame.

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