PATENT SPECIFICATION 773,387

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COMPLETE SPECIFICATION.

Improvements in or relating to Mechanical Excavators.

I, ALFRED PILLAI, British Subject, of 31 Cairnhill Road, Singapore, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to mechanical excavators and has particular reference to a dolly percussion cutter for use in forming boreholes such as boreholes to receive files.

The usual form of dolly percussion cutter comprises a weighted hollow cylinder having a cutting edge at its lower end. The dolly percussion cutter, hereinafter referred to as a dolly, is suspended by a cable which passes over a pulley carried by a head which is mounted on sheers, the cable being operated to raise the dolly by a winch. When the dolly has been fully raised, the strain on the cable is relaxed to permit the dolly to drop by its own weight to penetrate the soil. It is then lifted from the bore hole thus formed and the soil in the bore of the dolly is removed by hand. The removal of the soil involves time and labour, especially where clay soil is concerned, and it is the object of the present invention to obviate this disadvantage of the usual kind of dolly by providing means whereby the soil in the bore of the dolly is ejected automatically when the dolly is raised.

Another object of the invention is to provide means whereby the soil is discharged clear of the bore hole being bored.

According to the present invention there is provided a mechanical excavator of the kind described, comprising a weighted hollow cylinder having a piston like element within the bore thereof, spring means whereby the element is loaded towards the top of the bore, a plate or the like connected to the element and disposed above the cylinder and spaced therefrom, and a fixed abutment which is contracted by the plate or the like when the cylinder is raised, the arrangement being such that when the cylinder is lifted the plate or the like contacts the abutment and causes the piston like element to move downwardly in the bore against the spring loading to effect the ejection of the soil within the bore.

The invention also includes means whereby the said abutment may be inclined so that when the said plate or the like contacts the abutment the cylinder is tilted out of the vertical in order to discharge the contents of the bore of the cylinder clear of the borehole made by the cylinder.

The invention will now be described more fully, by way of example, with reference to the accompanying drawings in which:—

Figure 1 is an elevation, partly in section, of a dolly percussion cutter in accordance with the present invention, and

Figure 2 is a side elevation in the direction of the arrow "A".

A dolly percussion cutter cylinder 1 having a cutting edge 2 is provided with a relatively heavy piston like plate 3 slidable within the bore of the dolly. Rigidly connected to the plate by nuts 4 and bars 5. These bars are slidable within bushed metal bearings 6 which may be formed integral with the cylinder 1. The bars are pin jointed as at 7 to a circular plate 8 having a central hole 9 through which a cable 10 for the suspension of the dolly is passed, the cable being anchored to the dolly by an eyebolt 11. The bearings 6 are counterbored as at 12 to receive relatively heavy compression springs 13 each having an abutment against the lower end of its respective counterbore and against the plate 8. It will be seen that the springs maintain the piston like plate 3 in contact with a web or partition 14 which may be formed integral with the cylinder 1. Thus there is no appreciable obstruction to the admission of soil into the dolly when it is dropped. A hole

[*Price 3s. 6d.*]

15 in the wall of the cylinder 1 allows the air imprisoned above the soil, to escape. A space 16 above the partition 14 may be filled with lead or other suitable material for increasing the weight of the dolly.

Pivotally mounted on sheer legs 17 as at 17A is a ring-like head 18 which pivotally mounts a block 19, the mounting being effected by trunnions 20. Fixed to the block, or formed integral therewith, is a bracket 21 which carries a pulley 22, the centre of the pulley being disposed eccentrically with respect to the centre of the trunnions 20. Axially of the block is a clearance hole 23 for the cable 10 which passes over the pulley 22 to a winch (not shown). Attached to the block 19 is a U-shaped member 24 provided with stops 25, 26. The stop 26 may be formed from a resilient material such as sponge rubber. Also fixed to the block 19 are bearers 27 the outer ends of which are curved as shown. If desired, the stop 26 may be adjustably mounted in order to provide various adjustments for the block 19.

In operation the dolly is repeatedly dropped and after each drop the bore of the dolly is filled with soil. During the raising of the dolly between each drop, the plate 8 contacts the abutment formed by the block 19 which results in the piston like plate 3 being forced downward which causes the soil in the bore to be ejected.

When the cable 10 is untensioned the block 19 may be in a state of balance about the trunnions 20, or it may be tilted so that the side of the block mounting the U-shaped member 24 is upwards, the stop 26 engaging the head 18. Any rocking motion of the block will be limited by the stops 25, 26. When, however, the cable is tensioned, a downward force will be applied through the centre of the pulley 22 with the result that the block 19 will be positively tilted about the trunnions in a clockwise direction. It will be understood that the clearance hole 23 is of such diameter that the cable is free to pass through the hole when the block is tilted. Since the undersurface of the block 19 will be inclined during the raising of the dolly, the plate 8 of the dolly on contacting the underside of the block will cause the dolly to be tilted and supported by the bearers 27, with the result that the soil in the bore of the cylinder 1 will be discharged clear of the borehole made by the dolly.

What I claim is :—

1. A mechanical excavator of the kind described, comprising a weighted hollow cylinder having a piston like element within the bore thereof, spring means whereby the element is loaded towards the top of the bore, a plate or the like connected to the element and disposed above the cylinder and spaced therefrom and a fixed abutment which is contacted by the plate or the like when the cylinder is raised, the arrangement being such that when the cylinder is lifted the plate or the like contacts the abutment and causes the piston like element to move downwardly in the bore against the action of the spring loading to effect the ejection of the soil within the bore.

2. A mechanical excavator of the kind described, comprising a weighted hollow cylinder closed at the head thereof, a piston like plate within the cylinder mounting bars which extend through the said head and which are disposed parallel to the axis of the cylinder, a spring surrounding each bar, a plate connecting the upper ends of the bars, a block mounted above the cylinder and adapted to be contacted by the said plate, and cable and pulley means for lifting the cylinder, the arrangement being such that when the cylinder is lifted by the cable so that the said plates contacts the block the piston like plate will be forced downwardly against the action of the spring to discharge the soil within the cylinder.

3. A mechanical excavator according to Claim 2, wherein the cylinder is supported from sheers having a head which pivotally mounts the aforesaid block, a pulley for the cable carried by the block arranged so that its axis is eccentric with respect to the pivotal mounting of the block, the arrangement being such that when the plate connecting the aforesaid bars contacts the block the cylinder is tilted and the discharge of soil from the cylinder clear of the borehole made by the excavator.

4. A mechanical excavator according to Claim 3, wherein the aforesaid head comprises a ring which provides a bearing for trunnions carried by the said block, and wherein means are provided on the ring to limit the rocking movement of the block.

5. A mechanical excavator according to Claim 3 or 4 wherein bearers are provided to support the cylinder when inclined.

6. A mechanical excavator substantially as described with reference to the accompanying drawings.

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15 in the wall of the cylinder 1 allows the air imprisoned above the soil, to escape. A space 16 above the partition 14 may be filled with lead or other suitable material for increasing the weight of the dolly.

Pivotally mounted on sheer legs 17 as at 17A is a ring-like head 18 which pivotally mounts a block 19, the mounting being effected by trunnions 20. Fixed to the block, or formed integral therewith, is a bracket 21 which carries a pulley 22, the centre of the pulley being disposed eccentrically with respect to the centre of the trunnions 20. Axially of the block is a clearance hole 23 for the cable 10 which passes over the pulley 22 to a winch (not shown). Attached to the block 19 is a U-shaped member 24 provided with stops 25, 26. The stop 26 may be formed from a resilient material such as sponge rubber. Also fixed to the block 19 are bearers 27 the outer ends of which are curved as shown. If desired, the stop 26 may be adjustably mounted in order to provide various adjustments for the block 19.

In operation the dolly is repeatedly dropped and after each drop the bore of the dolly is filled with soil. During the raising of the dolly between each drop, the plate 8 contacts the abutment formed by the block 19 which results in the piston like plate 3 being forced downward which causes the soil in the bore to be ejected.

When the cable 10 is untensioned the block 19 may be in a state of balance about the trunnions 20, or it may be tilted so that the side of the block mounting the U-shaped member 24 is upwards, the stop 26 engaging the head 18. Any rocking motion of the block will be limited by the stops 25, 26. When, however, the cable is tensioned, a downward force will be applied through the centre of the pulley 22 with the result that the block 19 will be positively tilted about the trunnions in a clockwise direction. It will be understood that the clearance hole 23 is of such diameter that the cable is free to pass through the hole when the block is tilted. Since the undersurface of the block 19 will be inclined during the raising of the dolly, the plate 8 of the dolly on contacting the underside of the block will cause the dolly to be tilted and supported by the bearers 27, with the result that the soil in the bore of the cylinder 1 will be discharged clear of the borehole made by the dolly.

What I claim is :—

1. A mechanical excavator of the kind described, comprising a weighted hollow cylinder having a piston like element within the bore thereof, spring means whereby the element is loaded towards the top of the bore, a plate or the like connected to the element and disposed above the cylinder and spaced therefrom and a fixed abutment which is contacted by the plate or the like when the cylinder is raised, the arrangement being such that when the cylinder is lifted the plate or the like contacts the abutment and causes the piston like element to move downwardly in the bore against the action of the spring loading to effect the ejection of the soil within the bore.

2. A mechanical excavator of the kind described, comprising a weighted hollow cylinder closed at the head thereof, a piston like plate within the cylinder mounting bars which extend through the said head and which are disposed parallel to the axis of the cylinder, a spring surrounding each bar, a plate connecting the upper ends of the bars, a block mounted above the cylinder and adapted to be contacted by the said plate, and cable and pulley means for lifting the cylinder, the arrangement being such that when the cylinder is lifted by the cable so that the said plates contacts the block the piston like plate will be forced downwardly against the action of the spring to discharge the soil within the cylinder.

3. A mechanical excavator according to Claim 2, wherein the cylinder is supported from sheers having a head which pivotally mounts the aforesaid block, a pulley for the cable carried by the block arranged so that its axis is eccentric with respect to the pivotal mounting of the block, the arrangement being such that when the plate connecting the aforesaid bars contacts the block the cylinder is tilted and the discharge of soil from the cylinder clear of the borehole made by the excavator.

4. A mechanical excavator according to Claim 3, wherein the aforesaid head comprises a ring which provides a bearing for trunnions carried by the said block, and wherein means are provided on the ring to limit the rocking movement of the block.

5. A mechanical excavator according to Claim 3 or 4 wherein bearers are provided to support the cylinder when inclined.

6. A mechanical excavator substantially as described with reference to the accompanying drawings.

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Mechanical Excavators.

I, ALFRED PILLAI, of 31 Cairnhill Road, Singapore, British nationality, do hereby declare this invention to be described in the following statement :—

Ejector for the ejection of clay or soil from dolly percussion cutter for pile drilling. A heavy metal circular flat plate is rigidly held by two vertical square or round bars. These bars slide through the dolly cutter head through bushed metal bearings. The top of these bars are pin-jointed to another heavy circular flat plate with a central hole. Two heavy compression springs are fitted round these bars so as to maintain the bottom plate in contact with the underside of the dolly head. Through the circular hole in the top plate the wire rope is fed on to the eyelet on the dolly head. The earth or soil in the bore of the dolly cutter is ejected by striking the top plate against a weighted tripod head.

A. PILLAI.

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