

D. J. BARNARD.

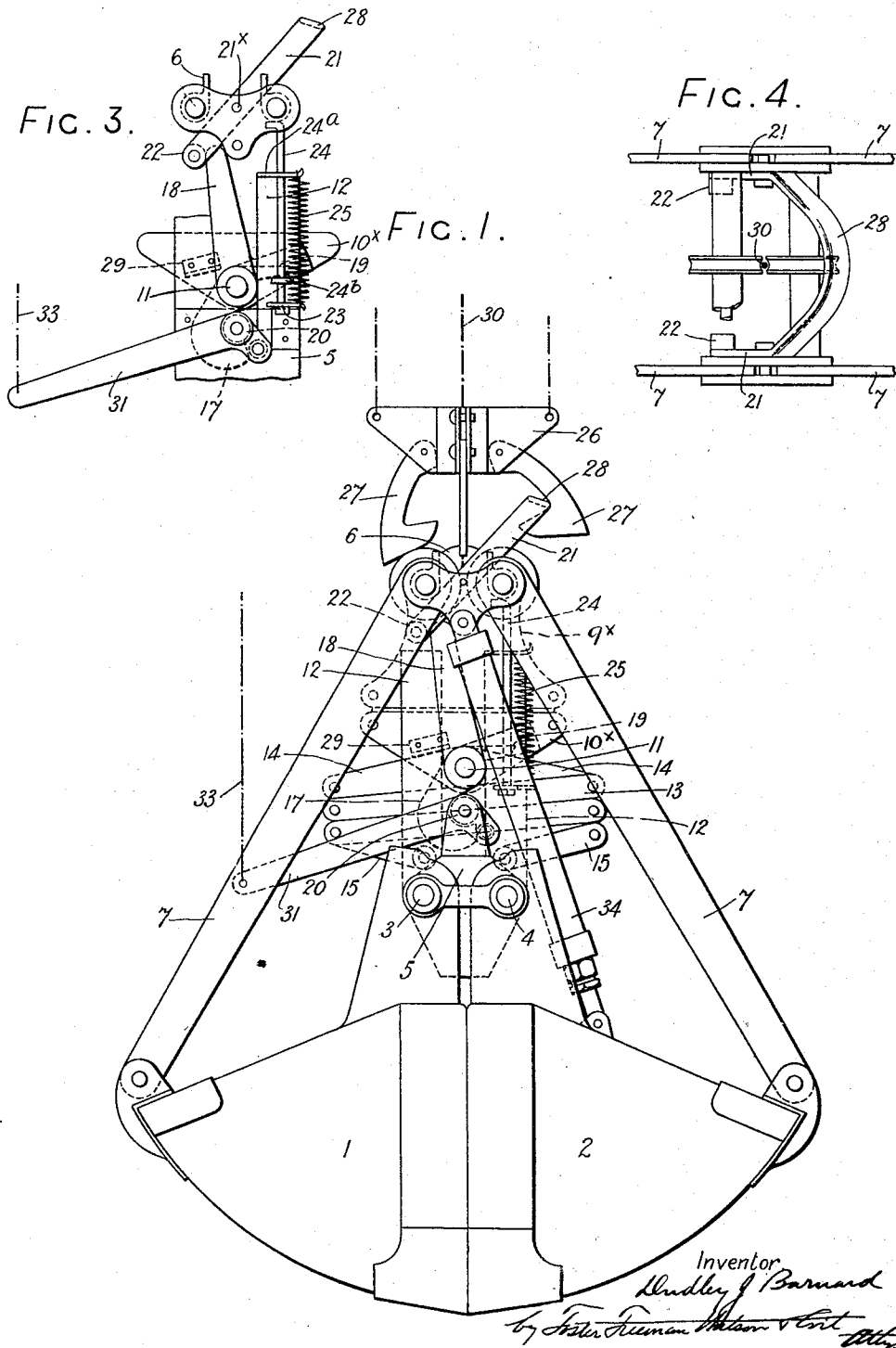
GRAB.

APPLICATION FILED JUNE 27, 1916.

1,218,921.

Patented Mar. 13, 1917.

2 SHEETS—SHEET 1.



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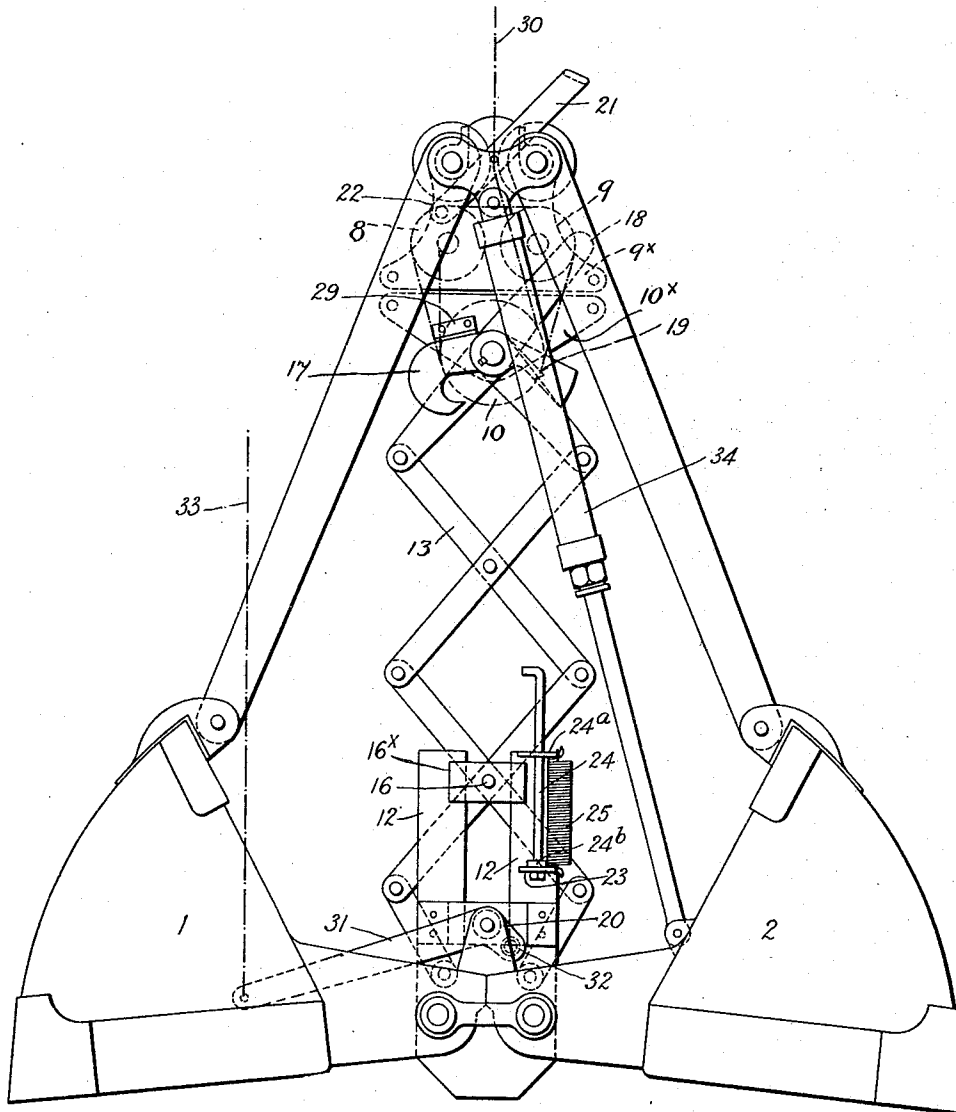
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2 SHEETS—SHEET 2.

FIG. 2.



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UNITED STATES PATENT OFFICE.

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GRAB.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DUDLEY JAMES BARNARD, a subject of His Majesty the King of Great Britain, and a resident of East Ham, in the county of Essex, England, have invented a certain new and useful Improvement in Grabs, of which the following is a specification.

This invention relates to grabs of what is known as the single chain type, that is to say, a grab in which all movements thereof are effected by means of a single chain or rope. In some forms of grabs of this type the hoisting chain or rope passes over and around two sets of purchase sheaves, or, a differential pulley block system, while in other forms, the hoisting chain or rope is wound upon a wheel, drum or the like which is automatically locked and unlocked at the desired times and coöperates with or controls the bucket closing and opening devices, and the invention will be described as applied to a grab of the first named form and its application to a grab of the second named form will be obvious.

The objects of this invention are to simplify the general construction of grabs of the type referred to without decreasing the digging power; to increase the balance and rigidity of the operative parts of the grab with respect to the bucket sections and to provide the grab with an improved form of locking and tipping mechanism.

In the accompanying drawings which illustrate one embodiment of the invention:—

Figure 1 is a side elevation showing the bucket sections of the grab in closed position,

Fig. 2 is a similar view showing the bucket sections in open position.

Fig. 3 is a detached view of the locking and trip mechanism and co-acting parts, and

Fig. 4 is a plan of the upper part of the grab, part of the cross-bar being broken away to illustrate the trip-lever.

In the drawings, 1 and 2 are the bucket sections, pivoted on independent pins 3, 4, on a cross-beam 5; the hinged portions on such sections may, if desired, be provided with interchanging means. 6 is the top-cross-bar and 7 the spreader-arms, one at each outer corner of the bucket sections. Supported by the top-cross-bar 6 in any desired manner are a set of purchase sheaves

8, 9, the two sheaves being mounted on separate spindles arranged parallel to each other instead of both being located on the same spindle, such spindles being mounted in a casing 9* carried by the top-cross-bar 6. The co-acting sheaves 10 are mounted in a casing 10* which also carries the power shaft 11, which shaft is arranged to move vertically to effect the closing of the grab.

Means are provided for preventing any tendency for the cross-beam and the mechanism carried thereby or connected thereto to tilt over or overbalance, such means being in part carried by the beam and in part by the power-shaft. For this purpose the beam 5 is provided with two pairs of vertically disposed guides 12, the position of such guides being preferably determined by the width of the sheaves or parts on the power shaft. Arranged in close proximity to the guides 12, preferably on the inside thereof, is a lazy-tongs device 13, the free ends of the top pair of levers or links 14 of which are pivotally mounted on the power-shaft 11 and the free ends of the bottom levers or links 15 are pivotally connected to the cross-beam 5, preferably on independent pins as shown.

The first central pivot pin 16 above the point of connection to the cross-beam 5, is furnished with a block 16* adapted to slide in the vertically disposed guides 12 as the power-shaft rises and falls.

The means for maintaining the bucket sections 1 and 2 in closed position comprises two gravity-catches pivotally mounted, one on each side of the sheaves 10, on the power shaft 11. Each gravity-catch is provided with three operative parts, a catch or supporting hook 17, an extending lever 18 and a weighted-lug 19. The hooks 17 are adapted to engage with pins or projections 20 on the cross-beam 5; the extending levers 18 are adapted to co-act with the lower end of a lever 21, which is preferably furnished with a pin or roller 22, the lever 21 hereafter referred to as the trip-lever, being pivotally mounted at 21* on the top-cross-bar 6, on a part carried thereby. The weighted lugs 19 are adapted to co-act with members 23 carrying verically disposed members 24, sliding in lugs 24^a and 24^b provided on the guides 12, said members being controlled by springs 25, one end of each spring being connected to the top of the guide 12 and the other end to the member 23.

The trip-lever 21 is adapted to co-act with a tipping-ring 26 carried by or hung from the jib of the crane, such ring being provided with a plurality of hook-shaped members 27 pivoted thereto in the manner shown, the hooks being arranged to face inwardly. The upper ends of the trip-levers 21 are connected together by means of a curved bar 28 adapted to engage with the hook-shaped members 27.

The operation of the grab constructed as above described is as follows:—

Assuming the grab to be closed as shown in Fig. 1, the weight of the buckets and the contents thereof are carried by the gravity-catches 17. The grab, in this condition, is drawn up to the tipping-ring 26 so that the bar 28 on the trip-lever 21 throws out and passes one of the hook-shaped members 27; if now the grab is lowered the hook 27 engages momentarily with one of the hook-shaped members 27, the result being that, the lever 21 is forced inward and the pin or roller 22 on the other end of said trip-lever 21 bears against the upper end of the levers 18 on the gravity-catch, throws same over and forces the hooks 17 out of engagement with pins 20 carried by the beam, and the bucket sections and beam, having lost their means of support, fall into their open position and the contents are discharged. Owing to the weighted-lugs 19, the hooks 17, after being disengaged from the pins 20, take up the position shown in Fig. 2, the upward movement of the hooks 17 being limited by stops 29 provided on the casing 10* carrying the purchase sheaves 10 and power-shaft 11. When it is desired to close the bucket sections, the hauling chain 30 is slackened which permits the casing 10* and thereby the power-shaft 11 and sheaves carried thereby to drop. As the power shaft approaches its lowest position, the extensible members 13 contract or fold and the weighted-lugs 19 come into engagement with the members 23, downward movement of which is resisted by the springs 25, the continued downward movement of the power-shaft causing the hooks 17 to be moved under the pins 20. The hauling chain 30 is then hauled in thus raising the power-shaft 11 and beam 5 until it again occupies the position shown in Fig. 1. As the parts approach their uppermost position the upper ends of the members 24 come into engagement with a part of the top-cross-bar and as the parts continue to rise the members 23 are depressed and moved away from the weighted lugs 19 against the action of the springs 25, as shown in Fig. 3, so that when the trip-lever is actuated the pull of the springs 25 is removed.

As it may be desired to open the buckets independently of the tipping-ring 26, bell-crank levers 31 may be pivoted on the cross-

beam 5, the short arms of such levers being provided with pins or rollers 32 adapted to bear against the ends of the hooks 17 as shown. To the long arms of the levers 31 chains or cords 33 are connected such chains or cords passing up to the jib of the crane or to a traveling carriage, capable of being actuated by the operator. If the chains or cords 33 are pulled the hooks 17 will be forced from under the pins 20 and the buckets will open in the manner previously described.

When it is desired to open the bucket sections by resting the grab on the ground or other part, the grab is first lowered into contact with the ground and the hoisting chain slightly slackened which allows the gravity catches to drop free from the pins 20. In this position the weighted-lugs 19 swing the hooks 17 into the position shown in Fig. 2 such movement being rendered possible by reason of the fact that, as above described and as shown in Fig. 3 when the grab is closed, the members 23 are removed out of contact with the lugs 19. If now the hauling chain be drawn in and the grab raised from the ground, the bucket sections will open as above described.

For the purpose of controlling the movements of the bucket sections a dash-pot 34 may be provided, one end of such dash-pot being pivotally connected to a part carried by the top-cross-bar and the other to one of the bucket sections.

What I claim is:—

1. In a grab of the kind herein described, the combination of means connecting the cross-beam and power-shaft for preventing any tendency on the part of said beam and power-shaft to overbalance, comprising a device which is extensible longitudinally and vertically but is otherwise rigid, independent means co-acting with said extensible device for guiding said beam and power-shaft into locking position, means for locking said parts together and means for disconnecting such locking means.
2. In a grab of the kind herein described, the combination of means connecting the cross-beam and power-shaft for preventing any tendency on the part of said beam and power shaft to overbalance, comprising a system of levers arranged in the form of a lazy-tongs, such levers being free to extend or contract vertically and longitudinally as the cross-beam and power-shaft come together, independent means co-acting with said levers, comprising vertically disposed guides rigidly fixed to the beam, for guiding said beam and power-shaft into locking position, means for locking said parts together and means for automatically disconnecting such locking means.
3. In a grab of the kind herein described, the combination of means connecting the

cross-beam and power-shaft for preventing any tendency on the part of said beam and power-shaft to overbalance, comprising a system of extensible levers, independent

5 means co-acting with said extensible levers to guide the cross-beam and power-shaft into locking position, means for locking said beam and shaft together comprising gravity catches pivotally mounted on the power-shaft and means co-acting therewith mount-
10 ed on the beam, and means for disconnecting said locking means.

4. In a grab of the kind described, the combination of means connecting the cross-beam and power-shaft for preventing any tendency on the part of said beam and power-shaft to overbalance, comprising a system of extensible levers, guides mounted on the beam, means carried by said exten-
15 sible levers co-acting with said guides, means for locking the cross-beam and power-shaft together and hand actuated means for disconnecting said locking means.

5. In a grab of the kind herein described, the combination of means connecting the cross-beam and power-shaft for preventing any tendency on the part of said beam and power-shaft to overbalance, comprising a system of extensible levers, independent
20 means co-acting therewith to guide said beam and shaft into locking position, means for locking said beam and shaft together and means, comprising a tipping ring for disconnecting such locking means.

35 6. In a grab of the kind herein described, the combination of means connecting the cross-beam and power-shaft for preventing any tendency on the part of said beam and power-shaft to overbalance, comprising a system of extensible levers, independent
40 means co-acting therewith to guide said beam and shaft into locking position, means for locking said parts together comprising gravity catches each catch consisting of a hook-shaped member, an extending lever and a
45 weighted lug, means on the beam co-acting

with the hook-shaped member, a trip-lever pivotally mounted on a part of the grab adapted to co-act with said extending lever, and a tipping ring co-acting with said trip- 50 lever.

7. In a grab of the kind herein described, the combination of means connecting the cross-beam and power shaft for preventing any tendency on the part of said beam and power-shaft to overbalance, comprising a system of extensible levers, independent means carried by the beam co-acting with said extensible levers for guiding said beam and shaft into locking position, means for
55 locking said parts together comprising gravity catches pivotally mounted on the power shaft, means on the beam co-acting with said catches, spring controlled means carried by the beam for moving said catches into en- 60 gagement with the means on the beam co-acting therewith as the power-shaft and cross-beam come together, means for moving said spring controlled means out of engage- 65 ment with said gravity catches, and means for disconnecting said gravity catches from the means carried by the beam. 70

8. In a grab of the kind herein described, the combination of means connecting the cross-beam and power-shaft for preventing any tendency on the part of said beam and power-shaft to overbalance, comprising a system of levers arranged in the form of a lazy-tongs, the free ends of the two upper levers being pivoted on the power-shaft, the
75 free ends of the two lower levers being pivoted on independent pivots on the beam, vertically disposed guides rigidly mounted on the beam, means on the lower pair of said levers for co-acting with said guides, means
80 for locking the beam and power-shaft together and means for disconnecting said locking means when it is desired to open the grab. 85

In testimony whereof I have hereunto set 90 my hand.

DUDLEY JAMES BARNARD.