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OPERATING STRUCTURE FOR CLAMSHELL BUCKETS

Filed Oct. 3, 1927

2 Sheets-Sheet 1

Fig. 1

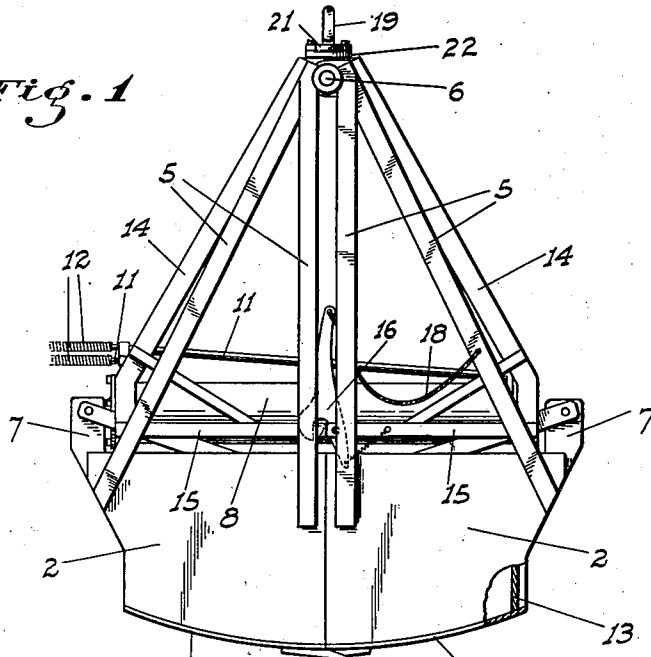
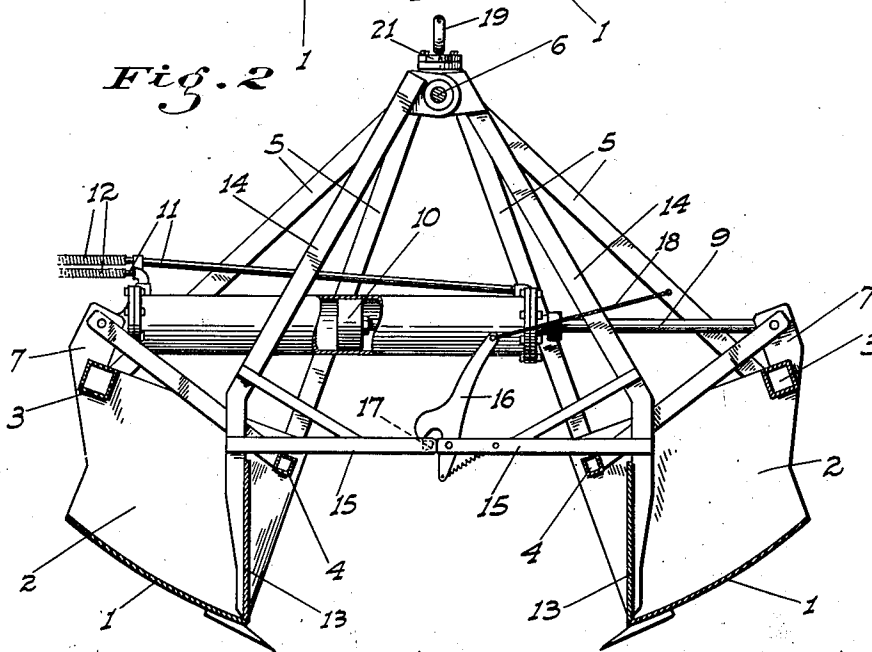


Fig. 2



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Fig. 3

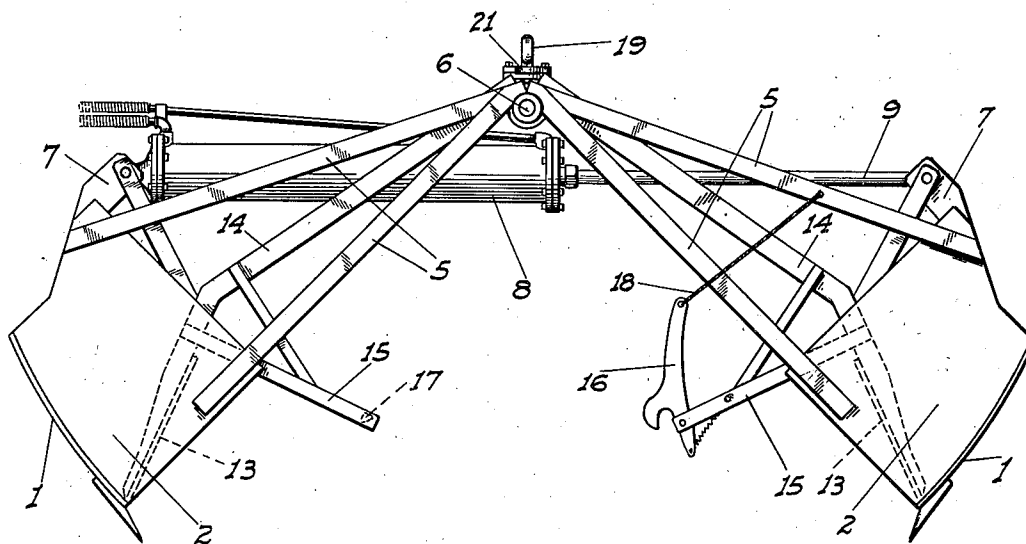


Fig. 4

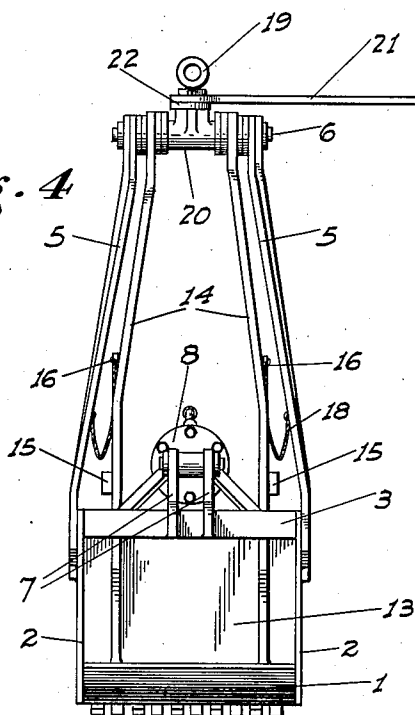
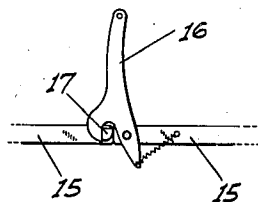


Fig. 5



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OPERATING STRUCTURE FOR CLAMSHELL BUCKETS

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This invention relates to improvements in dredging apparatus of that type which utilizes a bucket of the opposed grab or so-called clam-shell form. Such buckets are all constructed on the same general principle and include opposed bucket sections or grabs pivoted together for opening and closing movement. There are various mechanisms in common use today for applying the closing movement of the grabs by means of a pull on the operating cable. As far as I am aware, however, such pull no matter what the type of bucket mechanism controlled thereby may be, always tends to impart a vertical movement to the bucket simultaneously with the closing of the grabs. The result is that under certain conditions, especially when attempting to operate in hard ground, the grabs will be closed without appreciably digging into the ground and the bucket will be raised with at best only a partial load.

The principal object of my invention therefore is to arrange a bucket opening and closing structure of such a nature that the usual operating cable is eliminated and the opening and closing movement is imparted to the bucket sections in such a manner that they positively dig into the ground without any tendency for the bucket to raise being present with such digging movement.

A further object is to provide an operating mechanism of such a character that there is nothing to get out of order or become deranged.

A still further object of the invention is to construct the buckets themselves so that as the bucket sections are opened the load will be positively discharged therefrom regardless of the character and consistency of the load and without any possibility of a portion of the load clinging to the bucket, as is now frequently the case, especially when the ground is of a clayey nature.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of

parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation of my improved bucket structure shown in its closed position.

Fig. 2 is a sectional elevation of the structure in a partly open but fully dumped position.

Fig. 3 is a similar view of the bucket fully opened, in position for initial digging engagement with the ground.

Fig. 4 is an end view of the bucket structure.

Fig. 5 is a side elevation of an end gate catch unit.

Referring now more particularly to the characters of reference on the drawings, the bucket as usual comprises two sections or grabs, each of which consists of a bottom plate 1 and side plates 2, the side plates being connected at the back and upper ends by hollow cross beams 3 and at their forward ends adjacent the top by similar beams 4. The adjacent vertical edges of the side plates abut against each other throughout their extent when the sections are in their closed positions as usual so as to form a continuous dirt holding enclosure.

Rigid arms 5 project upwardly from the side plates on both sides thereof at back and front, each pair of arms on the same side converging to and being rigidly connected together at their upper ends, independent of the arms of the other section. At such upper ends the arms are turnably mounted on a transverse shaft 6 which is disposed in a vertical plane centrally of the bucket. The bottom plates 1 are curved concentric with the shaft for a purpose hereinafter seen.

Secured onto the beams 3 adjacent the center of width of the grabs are pairs of up-standing ears 7. A horizontal cylinder 8 is pivoted at its head end onto the ears of one grab, while the outer end of the cooperating piston rod 9 is pivoted onto the ears of the other grab; said pivotal points of the cylinder and rod being in a common horizontal

plane. The piston projects through the end of the cylinder opposite to that pivoted onto the ears and has a piston 10 slidable in the cylinder. Separate water intake pipes 11 are connected to the opposite ends of the cylinder, said pipes being attached to lengths of flexible hose 12 which extend to a suitable water pumping mechanism on the dredger from which the bucket is supported. It will therefore be seen that if water is forced into the head or pivoted end of the cylinder, the grabs will be forced apart, and if the water on the other hand is admitted to the opposite end of the cylinder the grabs will be drawn together. It will thus be seen that the opening and closing movement of the grabs is governed by the proper admission of water to the cylinder, and the movement thus imparted to the buckets will tend to cause them to dig directly down into the ground and will not impart any lifting movement to them in the slightest degree.

The grabs are forced to discharge their load as they are opened apart by the following structure:

Instead of the backs of the grabs being integral parts with said grabs, as is commonly done, I form such backs as relatively movable endgates 13. These endgates are disposed between the beams 3 and 4 and each is attached to arms 14 which project upwardly therefrom and are turnable, independently of the arms 5 and of each other, on the shaft 6. These gates when the grabs are closed are disposed adjacent the opposite ends thereof and are kept from possibly approaching any closer to each other by means of horizontal bars 15 which are preferably disposed a short distance above the bucket and extend toward and normally abut against each other. To prevent the separation of the endgates until the grabs have been opened a predetermined extent, pivoted catch levers 16 are mounted on the corresponding bars 15 of one endgate, which normally engage lugs 17 on the adjacent ends of the other bars.

The levers at their upper ends are connected to one end of cables 18 which at the other end are secured to the arms 5 of the same grab in connection with which the levers are mounted. The cables are normally slack, their length being such that they are under tension and have pulled the levers to disengage them from the lugs 17, by the time the endgates are disposed adjacent the forward ends of the grabs as shown in Fig. 2. It will therefore be seen that since the endgates are held stationary up to that time, the opening movement of the grabs will cause the load in the grabs to be positively discharged therefrom, since the action is just the same as if the grabs were stationary and the endgates were shoved forward from back to front.

Since the endgates are pivoted on the shaft 6 from which the arc of curvature of the bot-

tom plates 1 is struck, such endgates will be maintained in proper engagement with said bottom plates throughout their movement lengthwise of the grabs.

After the catches have been disengaged a further spreading of the grabs enables the endgates to move freely therewith, said gates being prevented from moving clear from the front ends of the grabs on account of the fact that they are stopped by the cross beams 4 as is shown in Fig. 2.

When the grabs start to close from their natural digging position, as in Fig. 3, the gates are still of course at the forward ends of the grabs, but being free to move toward the back ends thereof, the weight of the dirt engaged by the gates as the grabs are brought together, will force the gates apart, as will be evident, until they are stopped by the beams 3. Then when the grabs are completely closed the bars 15 will again abut and the catches 16 will automatically reengage the closing lugs, the cables being again slack, as will be evident.

The bucket is supported and raised and lowered by means of the usual cable arrangement which would be applied to an eye projecting upwardly from a sleeve mounted on the shaft 6 between the different sets of arms. In order to enable the horizontal setting or position of the bucket to be manually adjusted, an arm 21 projects radially from and is turnable and adjustably mounted on a horizontal circular saddle 22 fixed on the sleeve under the eye.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described by invention what I claim as new and useful and desire to secure by Letters Patent is:

1. A dredger bucket including opposed and cooperating bucket sections, means supporting said sections in a manner to enable them to open and close relative to each other, means for thus opening and closing the sections, endgates mounted in connection with the sections and positioned at the ends of the same opposite to their meeting edges when the sections are closed, said gates being movable relative to the sections and to each other, and means holding said gates stationary relative to each other as the sections are being opened until with such opening the endgates lie adjacent the adjacent ends of the bucket sections.

2. A dredger bucket including opposed and cooperating bucket sections, means support-

ing said sections in a manner to enable them to open and close relative to each other, means for thus opening and closing the sections, endgates mounted in connection with the sections and positioned at the opposite ends of the same when the sections are closed, said gates being movable relative to the sections, releasable catch means holding said gates stationary relative to each other as the sections are being opened, and means automatically releasing said catch means by the time the sections and gates assume a predetermined position relative to each other with the opening of the sections.

3. A structure as in claim 2, with means then acting to cause each section and its gate to move together as a unit if said sections are opened further apart.

4. A dredger bucket including opposed and cooperating bucket sections, means supporting said sections in a manner to enable them to open and close relative to each other, means for thus opening and closing the sections, endgates mounted in connection with the sections and positioned at the opposite ends of the same when the sections are closed, said gates being movable relative to the sections, releasable catch means holding said gates stationary relative to each other as the sections are being opened, and means mounted in connection with one bucket section for releasing the catch means by the time the sections reach a predetermined open position relative to each other.

5. A dredger bucket comprising opposed bucket sections, arms secured to and projecting upwardly from the sections, a common pivot member for the upper ends of the arms; the bottom of the sections being concentric with said pivot; endgates for the sections, arms projecting upwardly from the endgates and pivoted on said member, means normally holding said gates stationary relative to each other and at the opposite ends of the sections when the latter are closed, and means for opening and closing the sections.

6. A structure as in claim 1 with means acting on the endgates after the sections have been opened said predetermined distance, for causing the endgates to move with the sections as a unit with any further opening movement of the same.

7. A dredger bucket including opposed bucket sections pivoted for opening and closing movement relative to each other and whose meeting edges when adjacent each other lie in a vertical plane, endgates movable relative to the sections and to each other and disposed in vertical planes at the opposite ends of the sections when the latter are closed, and means holding the endgates in such positions while the sections are being opened until the adjacent edges of the sections are adjacent the endgates whereby the sections may be completely discharged of any

load while a free vertical space between the endgates is had to receive a subsequent load therebetween.

8. A dredger bucket including opposed bucket sections pivoted for opening and closing movement relative to each other and whose meeting edges when adjacent each other lie in a vertical plane, endgates movable relative to the sections and to each other and disposed in vertical planes at the opposite ends of the sections when the latter are closed, and means holding the endgates in such positions while the sections are being opened until the adjacent edges of the sections are adjacent the endgates, and rigid transverse members on the sections in front of the endgates to engage the same and cause them to spread apart with any further opening movement of the sections.

In testimony whereof I affix my signature.
ROBERT G. LE TOURNEAU.