

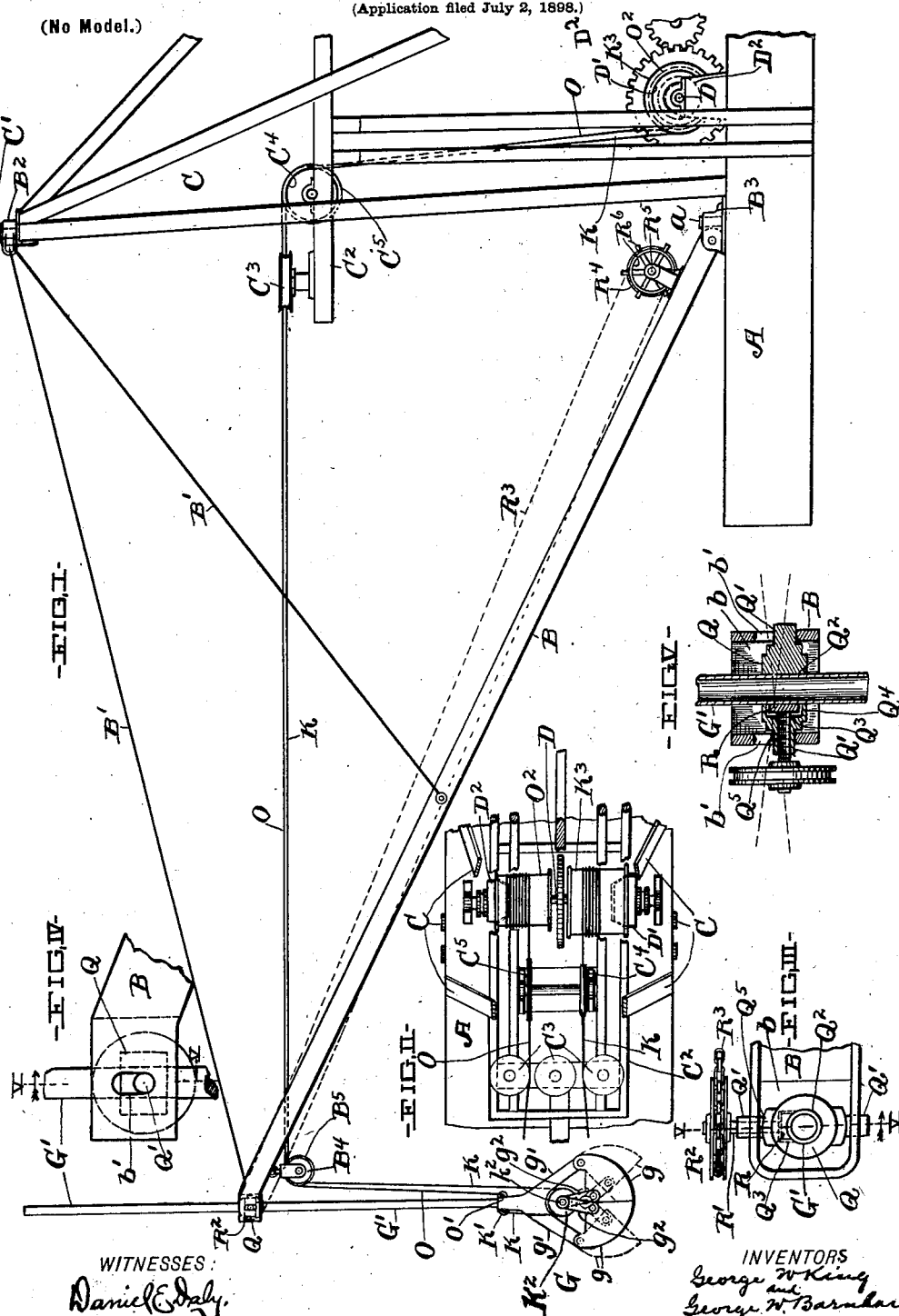
No. 648,720.

Patented May 1, 1900.

G. W. BARNHART & G. W. KING.  
EXCAVATOR.

(Application filed July 2, 1898.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

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## EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 648,720, dated May 1, 1900.

Application filed July 2, 1898. Serial No. 685,011. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE W. BARNHART, residing at San Francisco, county of San Francisco, State of California, and GEORGE W. KING, residing at Marion, county of Marion, State of Ohio, have invented certain new and useful Improvements in Excavators; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

Our invention relates to improvements in excavators, and appertains more especially to a machine of the character indicated that comprises the following elements: a boom, a so-called "clam-shell" excavating-bucket having a long handle or stem and comprising any suitable number of sections hinged or pivoted at the top and capable of separating and thereby opening the bucket; other means, preferably a suitably-operated and suitably-applied cable for closing the bucket and thereupon hoisting the bucket and holding the sections of the bucket closed together while the bucket is being hoisted; other means, preferably a suitably-operated cable for supporting the load preparatory to and during the dumping of the load after the bucket closing and hoisting cable has been released, and a suitably-operated clamping device for positively holding the bucket's stem while the bucket is being closed.

The primary object of the invention is to provide means for clamping the stem of the bucket after the latter has been dropped with its jaws open and preventing the bucket from rising out of the mud or material being operated upon while the sections of the bucket are being closed together preparatory to the hoisting of the load.

With this object in view and to the end of realizing certain structural advantages hereinafter noted the invention consists in certain features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a side elevation of an excavator embodying

our invention. Fig. II is a top plan of portions of the same. Fig. III is a top plan of the outer portion of the boom and shows among other things the clamping device for clamping the handle or stem of the shovel. Fig. IV is a side elevation of the outer end of the boom. Fig. V is a transverse section on line V V, Figs. III and IV. Figs. III, IV, and V are drawn on a larger scale than Figs. I and II.

Referring to the drawings, A designates the hull or body portion of the dredge or machine, and B represents a boom with which the forward end of the machine is provided. The boom is supported from the body portion in such a manner as to render it capable of being swung or adjusted laterally, and to this end the outer portion of the boom is connected by any suitable number of rods B' with a sleeve B<sup>2</sup>, that is rotatably mounted upon the vertical pin or bearing C', with which the upper end of the upright framework C of the body portion is provided, and which constitutes the upper pivotal center of the boom, that at its inner end and at the bottom is provided with a sleeve B<sup>3</sup>, that is mounted upon the vertical pin or bearing a, with which the hull or body portion of the machine is provided, and which constitutes the lower pivotal center of the boom. The upper pivotal center of the boom is coincident with the boom's lower pivotal center. The excavating shovel or bucket G is arranged to operate below the outer end of the boom. The bucket is of the clam-shell variety and comprises, preferably, two scoop-shaped sections or jaws g g, that are capable of swinging in a vertical plane toward and from each other, and consequently each section g is pivoted at the top and outer side horizontally to the lower end of an arm or arms g', that depend from the lower end of the handle or stem G', with which the bucket is provided—that is, the upright handle or stem G' of the bucket at its lower end is provided with any suitable number of arms g', to which one of the bucket-sections at the latter's top and outer side is pivoted, and is provided with another arm or arms g', to which the other

bucket-section at the latter's top and outer side is pivoted, and of course the bucket-sections have their axes parallel.

In solid lines, Fig. 1, the bucket is shown closed—that is, its sections  $g g$  are closed together. In dotted lines, same figure, the bucket is shown open, and consequently the bucket-sections are separated.

The bucket-sections separate by gravity when they are released by the means employed to close them together, and the bucket-closing means in the case illustrated comprises a suitably-actuated load-hoisting cable  $K$ , that is attached at one end, as at  $K'$ , to the lower end of the bucket's stem, thence leads downwardly to and in under a sheave  $G^2$ , that is supported, as will hereinafter appear, from both bucket-sections and has its axis parallel with the axes of the bucket-sections, and thence the cable leads upwardly to and over a sheave  $B^4$ , that is supported from the outer end of the boom and arranged vertically and longitudinally of the boom, and from the said sheave  $B^4$  the cable leads rearwardly, preferably in a horizontal plane, to and between horizontally-arranged sheaves  $C^3$ , that are supported from a platform  $C^2$  of the upright frame  $C$ , at or near the latter's central portion, and thence the cable leads rearwardly to and over a vertically-arranged sheave  $C^4$ , that is supported from the said frame at the rear of the sheave  $C^3$ , and thence the cable leads downwardly to and operatively engages the winding-drum  $K^3$ , that is loosely mounted upon a suitably-driven shaft  $D$ , that is arranged transversely of and supported from the body portion, and a suitably-operated clutch  $D'$  upon the said shaft is employed for establishing and interrupting operative connection between the drum and the shaft.

Each bucket-section  $g$  (one only being shown in Fig. 1) is connected by two links  $g^2$  with opposite ends, respectively, of the axle or pin  $k^2$ , that bears the bucket-sheave  $K^2$ , which links at one end embrace the said axle or pin and at their opposite end are pivoted to the bucket-section parallel with the latter's axis.

By our construction it is obvious that when the bucket is in its open position, as shown in dotted lines, Fig. 1, a pull upon the hoisting-cable  $K$  to the extent required by winding it upon the engaging drum will result in the elevation of the bucket-sheave  $K^2$ , and thereby through the connection between the bucket-sheave  $K^2$  and the bucket-sections close together the bucket-sections, as shown in solid lines, Fig. 1, against the action of the gravity of the said sections. After the laden bucket has been released from the clamp and elevated to the proper height and swung to the dumping-point the bucket closing and hoisting cable  $K$  is released, while another cable  $O$ , called the "dumping-cable" and attached to the bucket's stem, is employed in lifting the load, and upon the support of the load by cable  $O$  after the release of cable  $K$  the jaws

or sections of the bucket proper open by gravity. The bucket after dumping is lowered and has its descent controlled by the cable  $O$ , and as soon as the bucket is in position to take another load the clamping device is rendered operative, and then the bucket closing and hoisting cable  $K$  is again operated. The dumping-cable  $O$  is attached at one end, as at  $O'$ , to the lower end of the handle or stem of the bucket and thence leads upwardly to and over a sheave  $B^5$ , that is supported from the outer end of the boom and has its axis coincident with the axis of the sheave  $B^4$ , and thence the cable  $O$  leads rearwardly to and between horizontally-arranged sheaves  $C^3$ , that are supported from the frame  $C$ , and thence to and over the vertically-arranged sheave  $C^5$ , that is supported from the said frame and has its axis coincident with the axis of the sheave  $C^4$ , and thence leads downwardly to and operatively engages the winding-drum  $O^2$ , that is loosely mounted upon the shaft, and a suitably-operated clutch  $D^2$  upon the said shaft is provided for establishing and interrupting operative connection between the drum and the shaft.

The clamping device for engaging the bucket's stem, and thereby holding the bucket preparatory to the closing of the bucket while the latter is in the mud or material being operated upon, comprises, preferably, the following: The said stem extends upwardly through the outer end of the boom and has bearing in a box  $Q$ , that is arranged centrally within an opening  $b$ , formed in and extending vertically through the outer end of the boom. Box  $Q$  has two trunnions  $Q' Q'$  projecting from opposite sides, respectively, of the box and supported from opposite side walls, respectively, of the opening  $b$ . The box, and consequently the bucket, is therefore capable of oscillating longitudinally of the boom, and opening  $b$  is large enough longitudinally of the boom to accommodate a limited tilting or oscillation of the bucket-stem or bucket in the said direction. The surrounding wall of the bucket-stem-engaging bore  $Q^2$  between the said bore and the inner end of one of the trunnions has a recess  $Q^3$ , that is in open relation with the bore  $Q^2$ , and the lower wall  $Q^4$  of the said recess affords a bearing or seat for the movable jaw  $R$  of the clamping device, which jaw is arranged to engage the adjacent side of the bucket-stem and clamp the latter against the opposite wall of the bore  $Q^2$ , which wall forms the stationary jaw of the clamping device. Jaw  $R$  is rendered operative or inoperative according as it is forced against or loosened relative to the bucket-stem, and the means for exerting a pressure upon the jaw comprises in the case illustrated a suitably-operated screw  $R'$ , arranged horizontally and transversely of the boom and engaging the outer side of the said jaw  $R$ . Screw  $R'$  engages the nut  $Q^5$ , formed integral with the box  $Q$ , and extends through the contiguous

trunnion of the box, and at the outer side of the trunnion is operatively provided with a pulley  $R^2$ , that is operatively connected by a chain or cable  $R^3$  with a pulley  $R^4$ , operatively mounted upon the suitably-operated shaft  $R^5$ , that is arranged transversely of and supported from the inner end of the boom and is provided with a hand-wheel  $R^6$  for operating the same. It is obvious that the movable clamping-jaw  $R$  is rendered operative or inoperative according as the shaft  $R^5$  is turned in the one or the other direction. The trunnion-engaging holes  $b'$  in the side walls of the opening  $b$  in the boom are elongated vertically to afford a limited swing to the bucket transversely of the boom. The limited capability of the bucket and its stem to swing longitudinally and crosswise of the boom prevents any undue strain from any cause upon the parts during the operation of the machine. It is obvious, of course, that the bucket-stem is released as soon as the bucket has properly closed upon taking a load to accommodate the shifting of the bucket to the place of dumping.

What we claim is—

1. In an excavator, the combination with the boom, and the suitably-operated bucket arranged to operate below the boom and provided with an upwardly-extending stem; of a box affording lateral bearing for the stem, which box is supported from the boom and

has a limited play up and down, substantially as and for the purpose set forth.

2. In an excavator, the combination with the boom and the suitably-operated bucket arranged to operate below the boom, and provided with an upwardly-extending stem; of a box affording lateral bearing for the stem, and having two trunnions projecting from opposite sides, respectively, of the box, which trunnions are supported from the boom and have a limited play up and down, substantially as and for the purpose set forth.

3. In an excavator, the combination with the boom having an opening  $b$  extending vertically through its outer end and having the vertically-elongated openings  $b'$ , and the suitably-operated bucket and the latter's upwardly-extending stem; of the box  $Q$  having the trunnions  $Q'$ , the bore  $Q^2$  and the recess  $Q^3$ ; the movable clamping-jaw  $R$ , and means for operating the jaw, all arranged and operating substantially as shown, for the purpose specified.

Signed by us at Marion, Ohio, this 7th day of April, 1898.

GEORGE W. BARNHART.  
GEORGE W. KING.

Witnesses:

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