

(No Model.)

2 Sheets—Sheet 1.

A. W. ROBINSON.
DREDGE AND EXCAVATOR.

No. 508,122.

Patented Nov. 7, 1893.

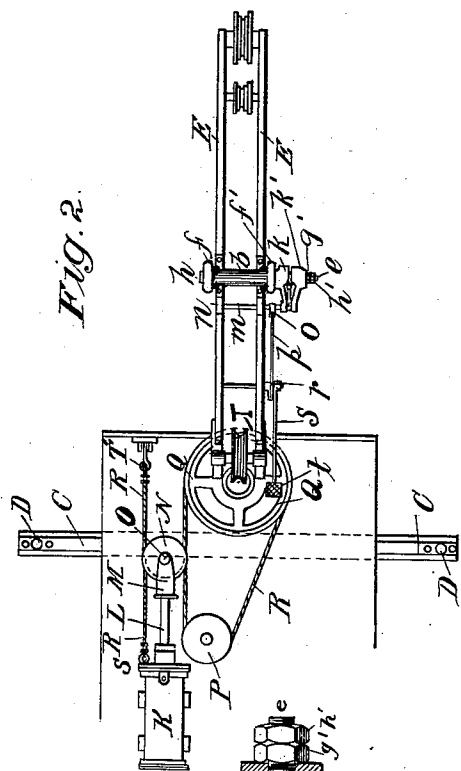
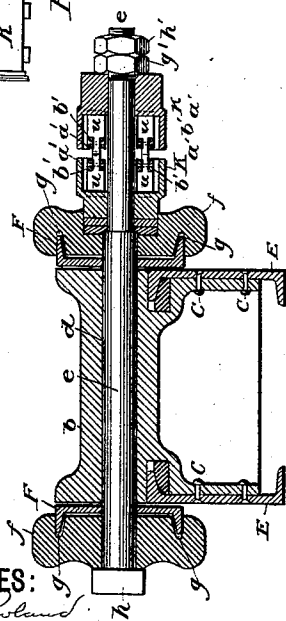
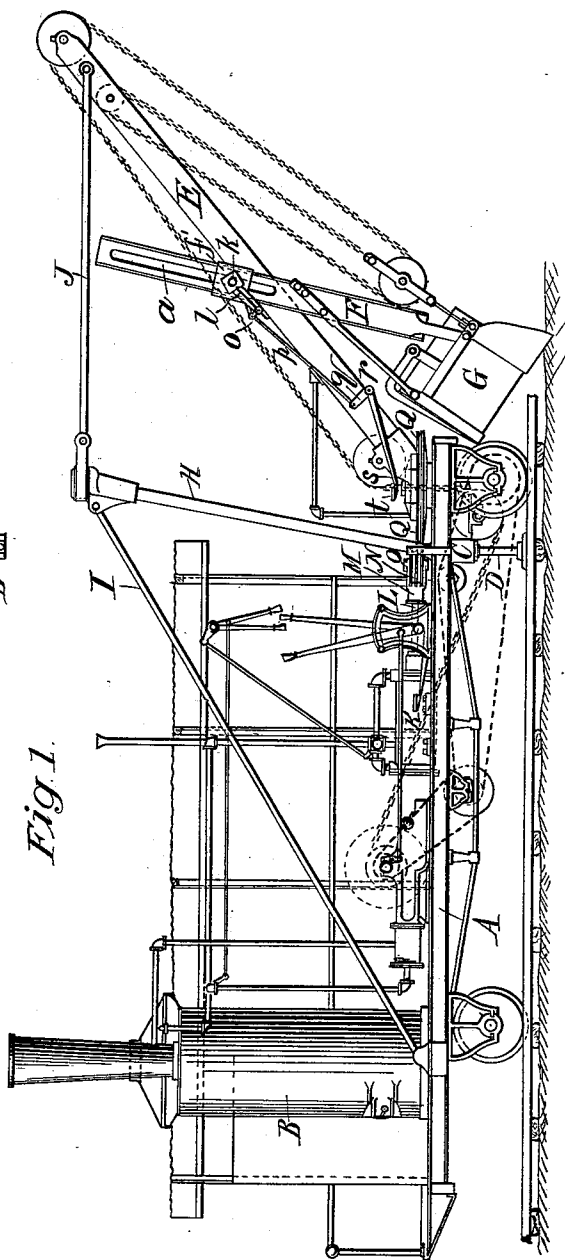


Fig. 9.



WITNESSES:
Edward C. Robinson
J. C. Hoffman



INVENTOR
Arthur W. Robinson
BY *Phillips Abbott*
his ATTORNEY

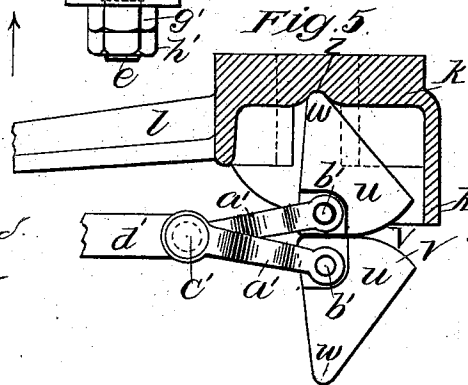
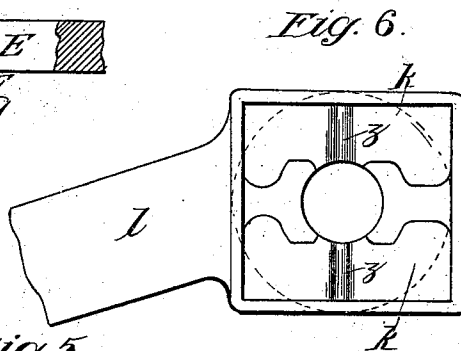
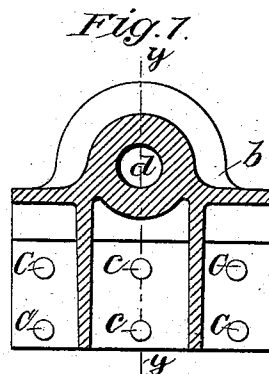
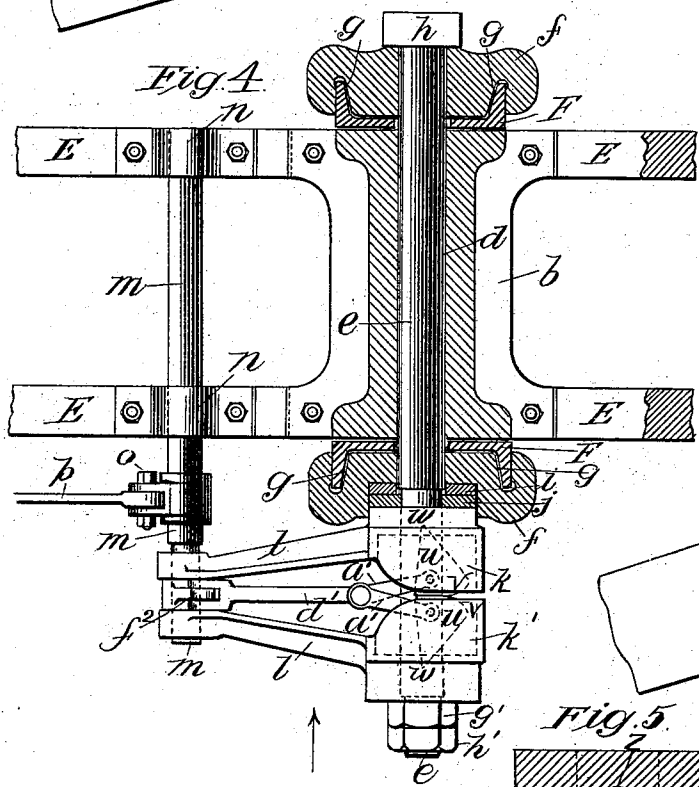
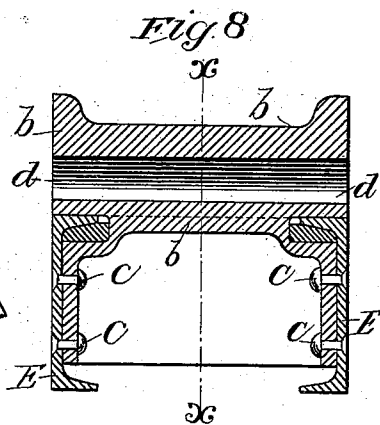
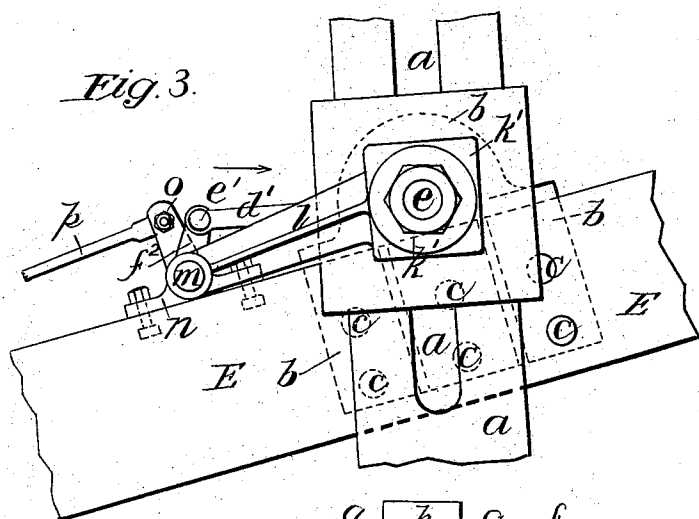
(No Model.)

2 Sheets—Sheet 2.

A. W. ROBINSON.
DREDGE AND EXCAVATOR.

No. 508,122.

Patented Nov. 7, 1893.



WITNESSES:

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INVENTOR

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UNITED STATES PATENT OFFICE.

ARTHUR W. ROBINSON, OF BUCYRUS, OHIO.

DREDGE AND EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 508,122, dated November 7, 1893.

Application filed September 22, 1891. Serial No. 406,479. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR W. ROBINSON, a citizen of the United States, and a resident of Bucyrus, in the county of Crawford and State of Ohio, have invented certain new and useful Improvements in Dredges and Excavators, of which the following is a specification.

My invention relates to improvements in dredging or excavating apparatus; and it consists, first, in means for swinging the boom and, second, to improvements in dipper controlling apparatus.

The first part of my invention consists in a steam cylinder, to the outer end of the piston whereof there is attached a bifurcated frame or bridge within which is journaled a double groove sheave. There is also upon the dredge or platform a stationary sheave; and a large pulley is attached to or made part of the turn table, and a single chain or rope is so combined with these elements as that the swinging and control of the boom are secured by the inward or outward movement of the piston, and by that alone, thus securing, as I believe, a device much more simple and much less expensive than any similar device heretofore known which at the same time is equally effective.

My devices for effecting the second part of my invention—to wit, the dipper controlling mechanism, consist in certain instrumentalities whereby the dipper arm is controlled by the operation of a pedal or other lever actuating device so that its movements are controlled or retarded as may be desired by frictional contact with it.

In the drawings Figure 1, is an elevation of my invention. Fig. 2, is a plan of the boom swinging devices. Fig. 3, is an elevation of the dipper controlling mechanism. Fig. 4, is a plan partly in horizontal section of the dipper controlling mechanism. Fig. 5 is a detail of the rolling toggles and coacting parts whereby the friction is applied to the dipper arm. Fig. 6, is an elevation of one of the boxes or casings within which one pair of the rolling toggles are secured. Fig. 7, is a sectional view on the line *x, x*, of Fig. 8 of the casting which holds the dipper controlling devices upon the boom. Fig. 8 is a section

on the line *y, y*, of Fig. 7. Fig. 9 is a view partly in section of the rolling toggles and the shaft upon which they are mounted, and certain of the adjoining parts.

A is a frame upon which the devices are supported, in this instance shown as a truck mounted upon wheels adapted to run upon a track as shown, the truck being provided with a boiler B, laterally projecting post bar C, provided with posts D, D, and with various other appliances for such an apparatus.

E is the boom.

F is the dipper arm.

G is the dipper.

H is the A frame which supports the boom by means of stay rods I and J, all as usual.

The various sheaves, draft chains, propelling devices and the other parts of an apparatus of this character which appear upon the drawings do not require special description. I will confine myself to those parts which have special reference to my invention.

K (see Fig. 2) is a steam cylinder. From it projects a piston rod L. Upon the end of the piston rod is a bifurcated frame or bridge like structure M within which rotates a double sheave N, a cross bolt or shaft O passing through the ends of the frame M, and also through the hub of the double sheave, being the shaft of the sheave.

P is another sheave rigidly fastened to the frame or platform of the dredge or car.

Q is a large pulley grooved upon its edge which is fastened to or formed upon the turn table upon which the boom E is stepped.

R is a cable or rope. It is fastened at S to the end of the cylinder or other suitable stationary point, and passes thence around one of the grooves in the double pulley N encircling it upon its forward half, in other words, the half which is farthest away from the cylinder. It then proceeds rearwardly around the sheave P; thence around the large pulley Q, secured in passing at some suitable point as at T on its periphery that it may not slip therefrom; thence back again around the other half of the double pulley N passing now however around its rearmost portion, in other words the portion nearest the cylinder; and thence to a stationary point T' upon the frame or platform where it is fastened.

The operation of this part of my invention is as follows: Steam is let into the cylinder K in any well known manner, and as the piston L moves outwardly or inwardly the position of the double sheave N is changed relative to the cylinder, and inasmuch as it is confined or encircled upon both sides by a bight of the rope or chain R, this change of position can only be effected by a movement of those parts of the rope or chain R which encircle the various sheaves and the pulley Q, because the ends thereof are both of them fixed. In this manner as will be seen the large pulley Q is rotated to the right or left depending upon the movement of the piston, and consequently the boom will be swung to the right or left, and it may be held stationary at any desired place by stopping the piston at the appropriate spot.

Referring now to Figs. 3 to 8, the following are the dipper controlling devices: As before stated E, E, are two channel bars which together constitute the boom. They are stayed together by stay bolts and other devices as usual. F, F, are two other channel bars which together constitute the dipper arm. They are slotted as at *a* (see Figs. 1 and 3). *b* (see Figs. 3, 4, 7 and 8) is a casting bolted by bolts *c*, *c*, &c., to the boom E. Through this casting is made a hole *d*, through which passes a shaft *e*. *f*, *f'* are two friction shoes composed of cast iron or other suitable material. They have cut transversely across their inner faces recesses or grooves *g*, *g* which correspond in contour with the flanges of the channel bars F, F, which compose the dipper handle. The friction shoe *f* is held in place by a head or nut *h* upon the end of the shaft or rod *e*, and the friction shoe *f'* is held in place by certain washers *i* and *j*, which are contained within the recess made in the shoe *f'*. *k*, *k'* are two boxes so-called (see Figs. 5 and 6) cast upon the ends of arms *l*, *l*, which arms are fulcrumed loosely upon the shaft *m* which turns in boxes *n* bolted to the boom E, and upon this shaft *m* is keyed or otherwise fastened a crank *o* provided with a rod *p* pivoted to it. The rod *p* (see Fig. 1) connects with a bell crank *q* which is pivoted at *r* to the boom, the other end of the bell crank being suitably extended into the powerful lever arm S upon the end of which is a foot pad *t* upon which the operator may press with his foot to actuate the devices. Within the boxes *k* *k'* are placed two pairs of rolling toggles *u* (see Figs. 4, 5 and 6). They have cam shaped surfaces *v*, *v*, which rolling together produce an endwise thrust in a manner well understood. The thrust is taken upon the bearing points *w*, *w*, of these rolling toggles which rest in concave recesses *z*, *z*, (see especially Fig. 6) made in the boxes *k*, *k'*. *a'*, *a'* are two links, there being of course four of them, which are pivoted respectively at *b'*, *b'*, to their appropriate rolling toggles, and at the other ends they are all pivoted at *c'*, to a connecting rod *d'* which is pivoted at *e'* to a crank *f²* keyed

or otherwise fastened to the shaft *m*. The box *k'* is held upon the shaft *e* by lock nuts *g'* and *h'*. 70

The operation of this portion of my invention is as follows: ordinarily the dipper arm slides freely up and down as may be desired the friction shoes *f*, *f'* being normally loose; or in other words not exerting any interfering pressure upon it. When now it is desired to control or modify the movement of the dipper arm the operator presses upon the pedal *t* whereupon through the crank *q*, connecting rod *p* and crank *o*, the rock shaft *m* is rotated in such manner that the crank *f²* and connecting rod *d'* and the links *a'*, *a'* pull the rolling toggles *u* together, the cam faces whereof engaging with each other exert an endwise thrust upon the shaft *e*, tending to pull it through the casting *b* and at the same time one pair of the toggles exerts a thrust upon the friction shoe *f'* in the opposite direction. The shaft *e* of course by reason of the head or nut *h* upon its end moves the friction shoe *f* with it. In this manner both the friction shoes *f*, *f'* are forced upon the channel bars F of the dipper arm, and act as a friction brake thereon, and it will be especially observed that the frictional pressure is applied to both sides of each of the flanges upon the channel bars which constitute the dipper arm. Thus there are four relatively extensive frictional surfaces in addition to the entire flat or inner side of each channel bar which are subjected to this controlling pressure. In this manner I secure a more thorough and perfect control over heavy dipper arms than in any other similar device known to me. 105

It will be obvious to those who are familiar with this art that a variety of modifications may be made in the apparatus above described and still the essentials of my invention be employed. I therefore do not limit myself to the details of construction. 110

I claim—

1. A boom swinging mechanism comprising essentially a steam cylinder and piston, a double sheave upon the piston rod, a fixed sheave, a pulley upon the turn table and a cable fastened at both ends to stationary points and which engages with said pulley and with both of said sheaves, substantially as set forth. 115
2. In a boom swinging mechanism a steam cylinder having a piston, a sheave upon the end of the piston rod, a grooved pulley upon the turn table and a rope or chain both ends of which are held stationary and which is also attached to said pulley on the turn table substantially as set forth. 125
3. The combination of a boom, a dipper arm a shaft mounted upon the boom and passing through the dipper arm, friction shoes mounted upon the shaft and means whereby the shoes may be forced upon the dipper arm, substantially as set forth. 130
4. The combination of a dipper arm composed of two slotted channel bars, a shaft

upon which the dipper oscillates, a casting for the support of the shaft fastened to the boom, two friction shoes mounted upon the shaft and means whereby the friction shoes may be forced upon the channel bars composing the dipper arm, substantially as set forth.

5. The combination of a boom a casting upon the boom, a shaft passing through the casting, a friction shoe held at one end of the shaft, an independently moving friction shoe on the other end of the shaft, rolling toggles bearing upon the shaft in one direction and the independently moving friction shoe in the other direction and means whereby the said toggles may be operated, substantially as set forth.

6. The combination of a boom a casting upon the boom, a shaft passing through the casting, a friction shoe held at one end of the shaft, an independently moving friction shoe near the other end of the shaft rolling toggles which exert pressure upon the shaft in one direction, and on the independently moving friction shoe in the other direction, boxes within which the rolling toggles are located which boxes are prevented from rotation by arms which are loosely fulcrumed upon a rock shaft, said rock shaft itself, a crank upon the same, a connecting rod and links between the crank and the rolling toggles and means whereby the rock shaft may be rocked, substantially as set forth.

7. The combination of a boom a dipper arm composed of two slotted channel bars, a shaft fixed upon the boom, two friction shoes having recesses conforming in contour to the flanges of the channel bars and means whereby the said shoes may be forced upon the channel bars substantially as set forth.

8. The combination of a boom a dipper arm composed of two slotted channel bars, friction shoes having recesses conforming to the shape of the flanges on the channel bars, a shaft passing through the slots in the channel bars

composing the dipper arm, and likewise passing through the friction shoes rolling toggles having cam faces which operate in one direction upon the shaft and in the opposite direction upon one of the friction shoes and means whereby the toggle arms may be actuated, substantially as set forth.

9. In dipper controlling mechanism a frictional device comprising essentially two friction shoes mounted upon a shaft which passes through both of them one of them being held to the shaft and the other movable independently of it and toggles constructed and arranged to move the shaft and one friction shoe in one direction and the independently moving shoe in the other direction and means for actuating the toggles, substantially as set forth.

10. A frictional device for dipper arms comprising essentially two friction shoes mounted upon a shaft one fixed thereon and the other moving independently thereof, a casting for the support of the shaft fastened upon the boom and means whereby the shaft and one shoe will be moved in one direction and the independently moving shoe in the other direction, substantially as set forth.

11. In dipper controlling mechanism double acting rolling toggles having cam shaped faces which roll upon each other, a connecting rod and links, a rock shaft and crank thereon, means whereby the rock shaft may be rocked and two friction surfaces moved upon the dipper arm in opposite directions, by the rolling toggles, substantially as set forth.

Signed at Bucyrus, in the county of Crawford and State of Ohio, this 15th day of July, A. D. 1891.

ARTHUR W. ROBINSON.

Witnesses:

E. K. SWIGART,
J. M. MILLMAN.