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G. SOUTHER.

EXCAVATING AND DREDGING MACHINE.

No. 258,951. Patented June 6, 1882.

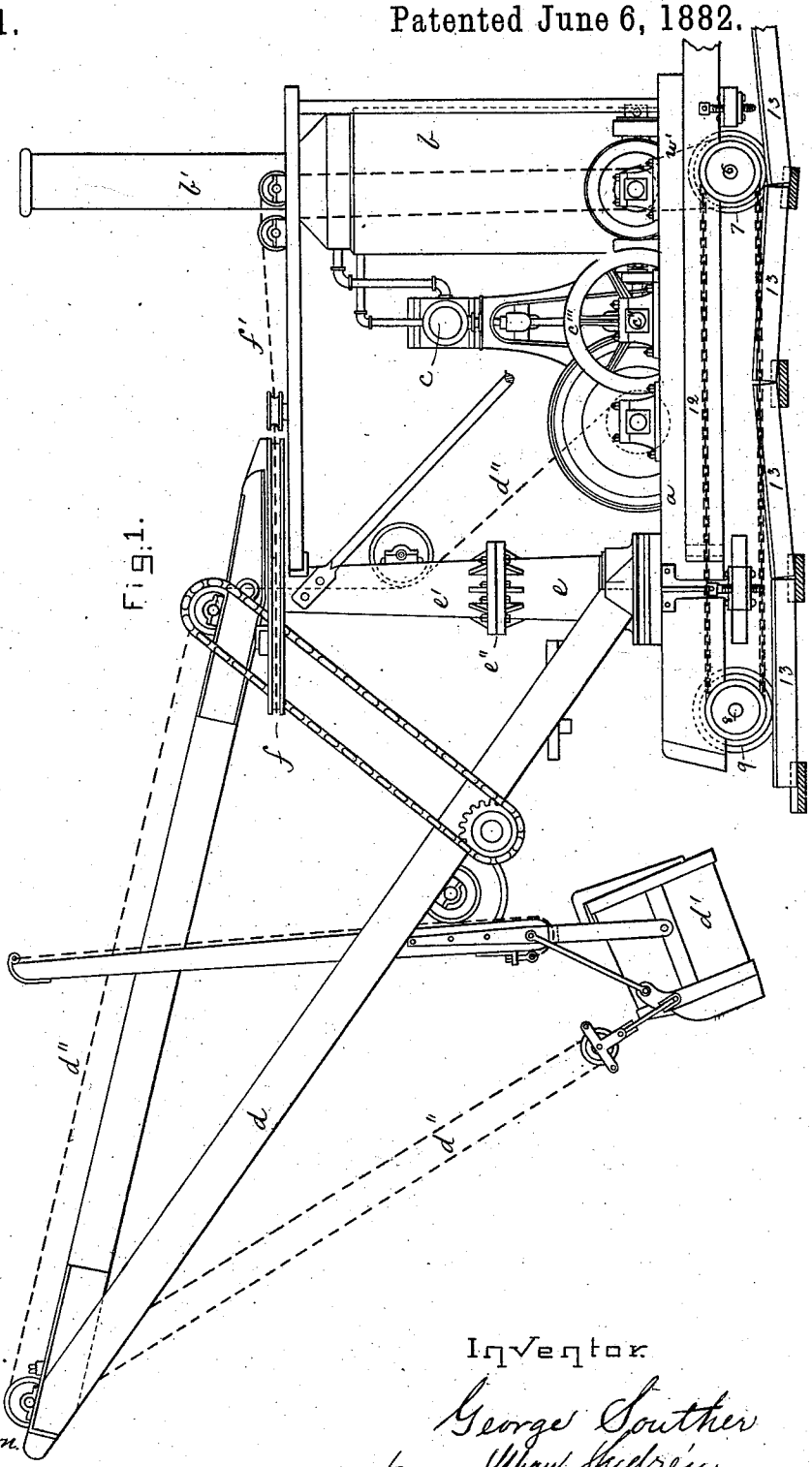

Fig. 1.

Witnesses.

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(No Model.) 4 Sheets—Sheet 2.

G. SOUTHER.

EXCAVATING AND DREDGING MACHINE.

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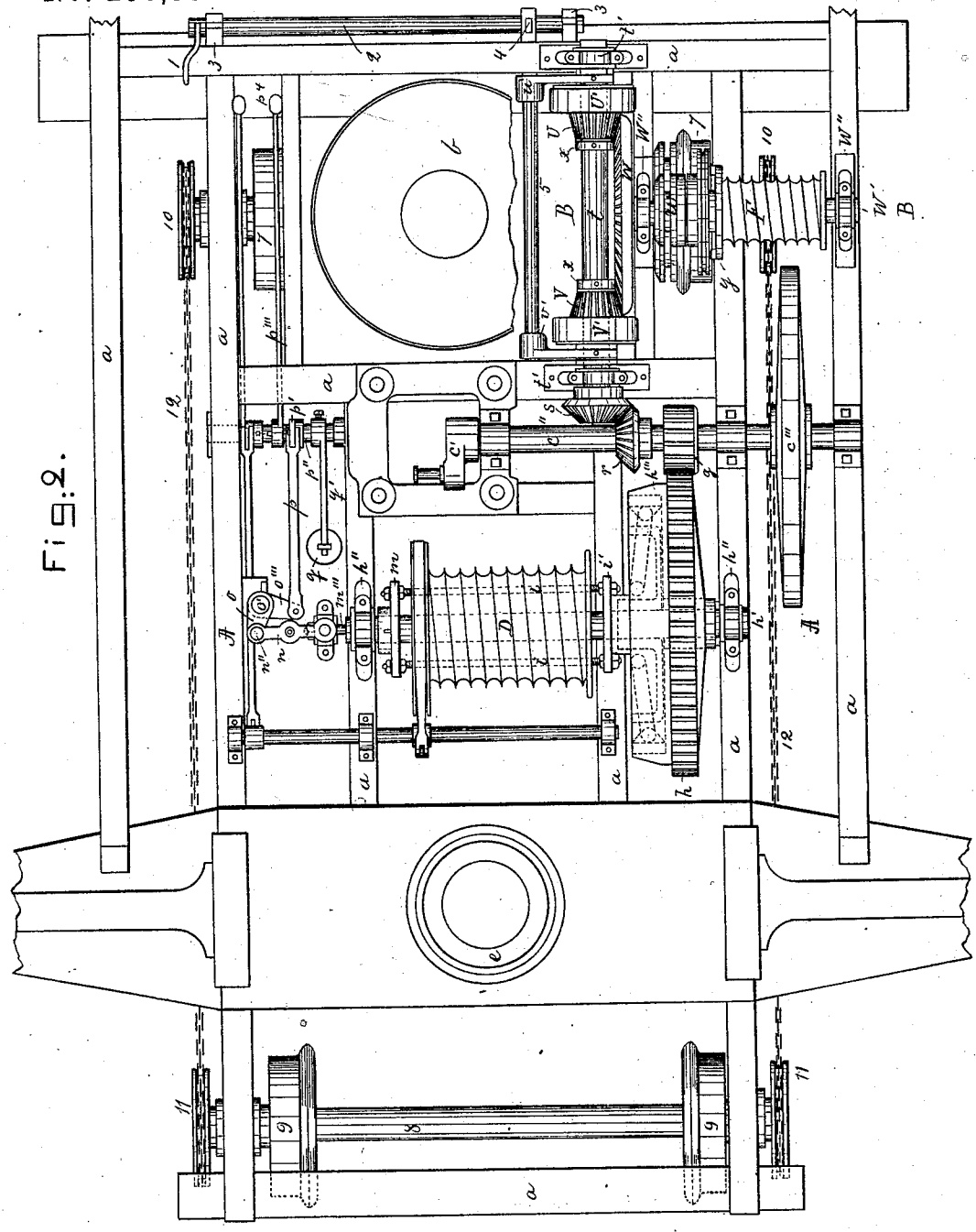
Fig. 2.



Witnesses.
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(No Model.) 4 Sheets—Sheet 3.

G. SOUTHER.

EXCAVATING AND DREDGING MACHINE.

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Fig. 3.

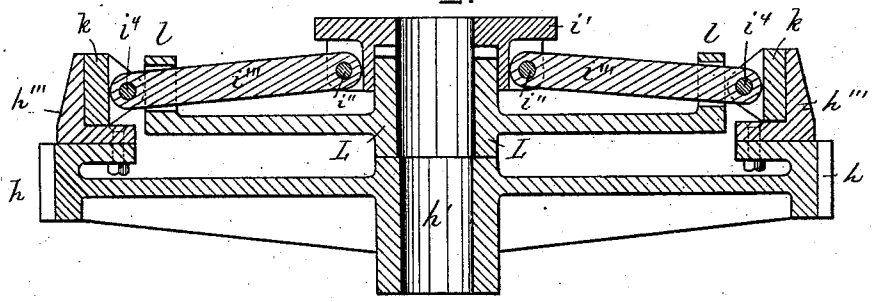


Fig. 4.

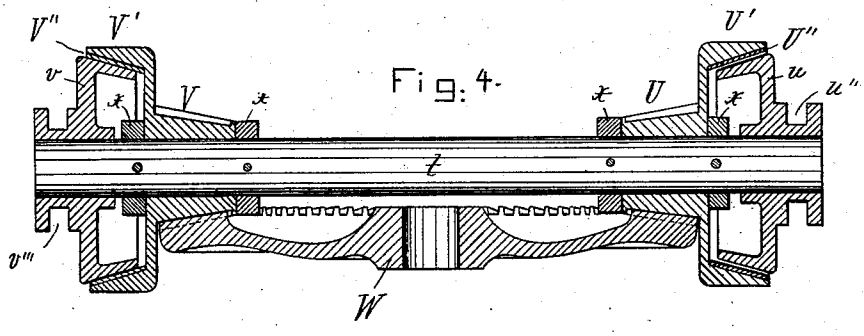


Fig. 5.

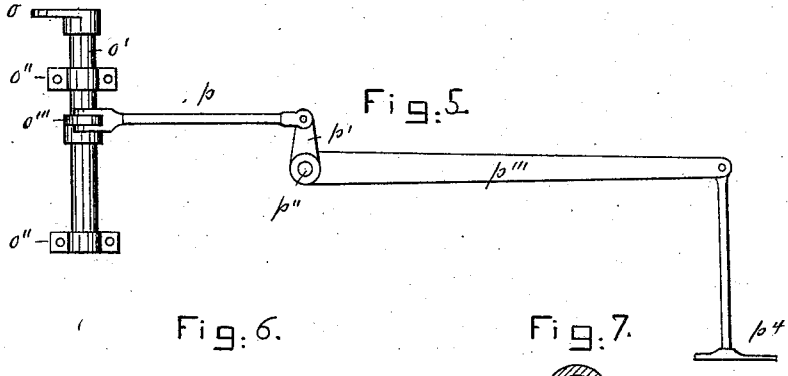


Fig. 6.

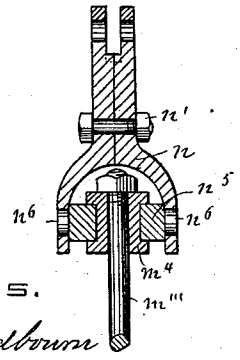
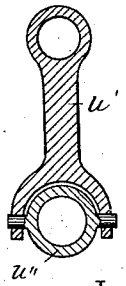


Fig. 7.



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(No Model.) 4 Sheets—Sheet 4.

G. SOUTHER.

EXCAVATING AND DREDGING MACHINE.

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Fig. 8.

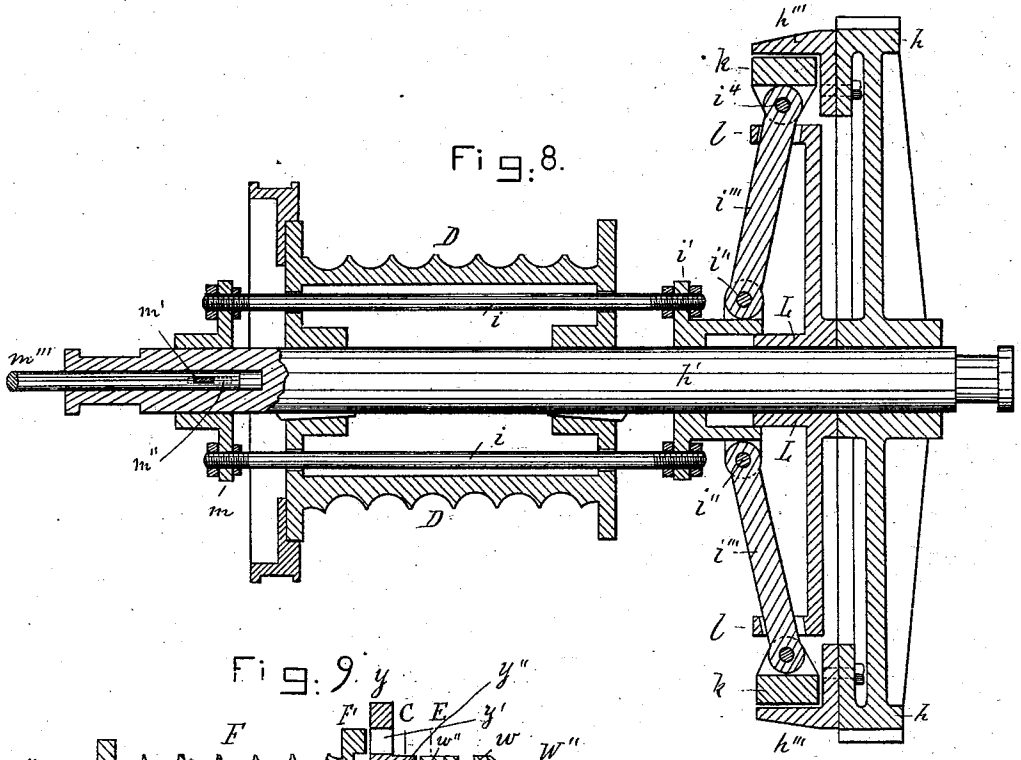


Fig. 9.

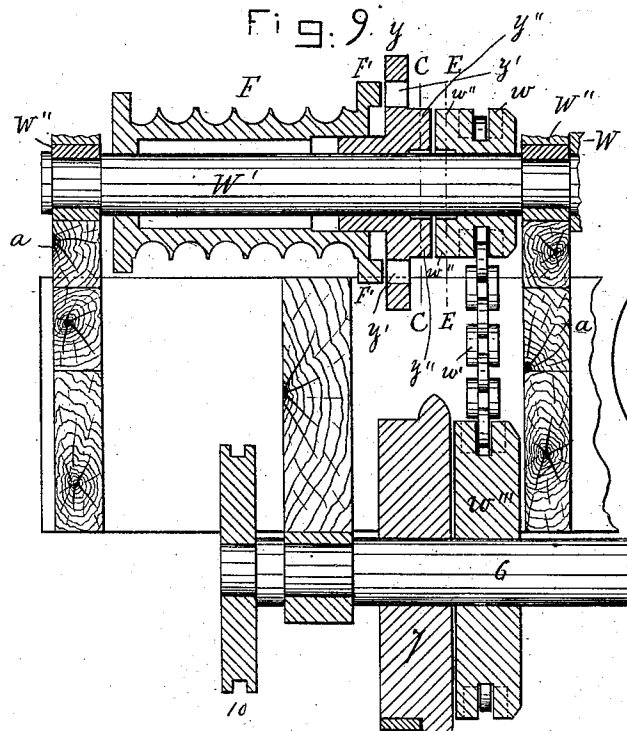


Fig. 10.

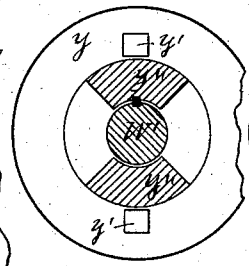
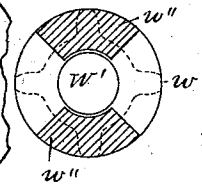


Fig. 11.



Witnesses.
Henry Chadbourn.
Sarah M. Goodrich.

Inventor.
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by Thos. Gudrew.
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UNITED STATES PATENT OFFICE.

GEORGE SOUTHER, OF BOSTON, MASSACHUSETTS.

EXCAVATING AND DREDGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 258,951, dated June 6, 1882.

Application filed February 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE SOUTHER, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Excavating and Dredging Machines; and I do hereby declare that the same are fully described in the following specification and illustrated in the accompanying drawings.

This invention relates to improvements in excavating and dredging machines; and it is carried out as follows, reference being had to the accompanying drawings, on which—

Figure 1 represents a side elevation of the machine. Fig. 2 represents a plan view of the same. Fig. 3 represents a detailed sectional view of the friction-clutch for the hoisting apparatus. Fig. 4 represents a sectional view of the friction-clutch mechanism for swinging the crane. Fig. 5 represents a detail side elevation of the foot-treadle and levers for operating the friction-clutch of the hoisting apparatus, and Fig. 6 represents a detail view of the forked connecting-link for the same. Fig. 7 represents a detail view of one of the forked levers for operating the friction-clutches for swinging the crane. Fig. 8 represents an enlarged section on the line A A, shown in Fig. 2. Fig. 9 represents an enlarged section on the line B B, also shown in Fig. 2. Fig. 10 shows a section on the line C C, shown in Fig. 9; and Fig. 11 shows a section on the line E E, also shown in Fig. 9, as will hereinafter be more fully shown and described.

In the drawings, *a a* represent the lower frame-work of the machine.

b is the steam-boiler. *c* is the steam-engine, with its crank *c'*, driving-shaft *c''*, and balance-wheel *c'''*, as usual.

d is the crane, with its scoop *d'* and hoisting-chain *d''*, as usual. The crane *d* is made to swing around the upper and lower ends of the post *e e'*, the latter being made of two hollow cast-iron parts—viz., a lower part, *e*, secured to the frame *a*, and an upper part, *e'*, bolted together at *e''* to the upper end of the lower part, *e*, as shown in Fig. 1, by which arrangement the upper part, *e'*, of the post may be detached from the lower part, *e*, in case the machine is to be transported on railroad-cars, so as to enable it to pass through tunnels or under bridges without coming in contact with the roofs of such. In such transportation of the machine the crane *d* and chimney *b'* of the boiler *b* are also detached from the machine.

f is the chain-wheel on the upper end of the post *e'*, to which the chain *f'* leads from the spiral chain-drum F for swinging the crane around its axis when the scoop is to be emptied, as usual. The hoisting mechanism is carried out as follows: On the driving-shaft *c''* is secured the pinion *g*, which engages into the teeth of the spur-gear *h*, running loosely on the shaft *h'*, located in bearings *h'' h''* on the frame *a a*, as shown in Fig. 1. To one side of the spur-gear *h* is bolted or otherwise secured an annular flange or rim, *h'''*, as shown in Figs. 1 and 3.

D is the spiral chain-drum, which is secured to the shaft *h'*, and the hoisting-chain *d''* is attached to one end of said drum D. Through longitudinal perforations in the drum D pass loosely a pair of longitudinally-adjustable rods, *i i*, (shown in dotted lines in Fig. 1,) the ends of which nearest to the spur-gear *h* are secured to a flanged ring, *i'*, loose on the shaft *h'*. To the said ring *i* are hinged, at *i'' i''*, the links *i''' i'''*, the outer ends of which are hinged at *i⁴ i⁴* to the friction plates or shoes *k k*, as shown in Fig. 3.

l l are guides or fulcra for the outer ends of the links *i''' i'''*, which guides or fulcra form a part of the hub L, secured on the shaft *h'*, as shown in Fig. 3.

It will thus be seen that by forcing the rods *i i* in the direction toward the spur-gear *h* the friction plates or shoes *k k* are brought to bear against the inside of the annular rim *h'''*, and by the frictional resistance thus produced between the shoes *k k* and rim *h'''* a rotary motion is conveyed to the hoisting-drum D from the spur-wheel *h*, and the two will continue to move together until the rods *i i* are moved in an opposite direction—that is, away from the spur-wheel *h*. The longitudinal adjustment of the rods *i i* is carried out by the following means: The rear ends of said rods *i i* are secured to the flanged ring or hub *m*, longitudinally adjustable on the shaft *h'*, and connected by means of pin or key *m'*, which passes through a slot, *m''*, in the shaft *h'*, to the short

central shaft, m''', which is longitudinally adjustable in the central bored-out part of the shaft h'. The outer end of the central shaft, m''', is secured to the flanged hub or collar m^4, which is supported and has its bearing in the cross-bar or ring m^5, the latter having its ends m^6 m^6 hinged to the forked link n, as shown in Fig. 6, the latter being made in two halves, secured together by means of the fastening-bolt n', to enable it readily to be attached and detached to and from the cross-bar or ring m^5 in making or repairing the device. The rear end of the forked link n is hinged at n'' to the lever o on the vertical rock-shaft o', (shown in Fig. 5,) which shaft is supported in bearings o'' o'', secured to the frame a. To the shaft o' is further secured the lever o''', which is hinged to the link p, the opposite end of said link being hinged to the lever p', secured to the rock-shaft p'', located in bearings on the frame a. To the rock-shaft p'' is secured the treadle-lever p''', provided with a suitable treadle, p^4, as shown in Fig. 5, and thus by downward pressure on the treadle p^4, and by the connecting mechanism, as above set forth, from it to the flanged ring i, the latter is forced toward the spur-wheel h and causes the shoes k k to be forced against the inside of the annular rim h''', for the purpose set forth. The shoes k k are automatically detached from contact with the rim h''' as soon as the operator removes his foot from the treadle p^4 by the weight q, hung on the outer end of the lever q', secured to the rocking shaft p'', as shown in Fig. 1.

The clutch mechanism for operating the spiral-chain drum F so as to swing the crane to the right and left, as well as to move the whole apparatus forward or back, is carried out as follows:

The bevel-gear pinion r, on the driving-shaft c'', gears into the teeth of a similar bevel-gear pinion, s, on the shaft t, the latter being supported in bearings t' t', secured to the frame a.

U and V are a pair of bevel-gear pinions, running loosely on the shaft t, and geared into the teeth of the bevel-gear W, as shown in Figs. 2 and 4. x x are collars on the shaft t, located close up to the ends of each of the bevel-gear pinions U and V, as shown in Fig. 4, to prevent the said pinions from moving longitudinally on the shaft t.

U′ is an annular tapering flange or rim on the gear U, and V′ is a similar annular tapering flange or rim on the gear V, as shown in Fig. 4.

U″ and V″ are frictional linings, respectively, attached to the inner surfaces of the rims U′ and V′, which linings may preferably be made of leather.

Upon the shaft t are located a pair of tapering friction clutch-wheels, u and v, the former being located in proximity to the rim U′ and the latter in proximity to the rim V′, which friction clutch-wheels are longitudinally adjustable on the shaft t and made to rotate with the latter, the hubs of such clutch-wheels being provided with keys fitting into corresponding key-beds on the shaft t, as is usual in such cases. It will thus be seen that by forcing the clutch u against the rim U′ and its packing U″ a rotary motion is imparted to the bevel-pinion U at the same time as the clutch v is disengaged from the rim V′ and its packing V″, allowing the bevel-pinion V to run loose on the shaft t, thus imparting a rotary motion in one direction to the bevel-gear W, and by sliding the clutches u v in the opposite direction a rotary motion is imparted to the pinion V, by which an opposite rotary motion is conveyed to the bevel-gear W, the pinion U during this time running loose on the shaft t. A simultaneous longitudinal motion is imparted to the clutches u and v by means of the hand-lever 1, secured to the rock-shaft 2, located in bearings 3 3 on the frame a, the said shaft 2 having secured to it a lever, 4, projecting into a corresponding perforation in the rear end of the longitudinally-adjustable shaft 5, to which are secured the forked arms u' v', to the ends of which are jointed, respectively, the rings u'' v'', resting loosely in the annular grooves u''' v''' on the hubs of the respective friction-clutches u and v. By moving the clutches u v so that neither of them is in frictional contact with the annular flanges U′ V′ no motion is imparted to the wheel W, as may be desired, when holding the crane in a permanent position, without turning it to the right or left during the descent or ascent of the shovel. The bevel-gear W is fast on the shaft W′, located in bearings W″ W″ on the frame a.

On the shaft W′ is loosely supported the sprocket or chain wheel w, as well as the spiral chain-drum F, between which is secured, upon the shaft W′, a clutch-plate, y, which has perforations y' y', to receive projections F′ F′ on the spiral drum F when the latter is moved longitudinally on the shaft W′, so as to connect the drum F to the clutch-plate y. The drum F may be moved on the shaft W′ by means of any of the ordinary clutch-levers or bars, (not, however, shown in the drawings,) to connect it and disconnect it to and from the clutch-plate y.

On the side of the chain-wheel w are clutch-projections w'' w'', which may be locked between corresponding clutch-projections, y'' y'', on the side of the clutch-plate y, when desired to set the sprocket-wheel w in a rotary motion for moving the machine forward or back, as will be described.

From the chain-wheel w leads a chain, w', to another chain-wheel, w''', on the rear truck-shaft, 6, to which the flanged wheels or rollers 7 7 are secured. 8 is the forward truck-shaft, with its flanged wheels or rollers 9 9, as shown in Figs. 1 and 2. 10 10 are chain-wheels secured to the rear truck-shaft, 6; and 11 11 are similar chain-wheels on the forward truck-shaft, 8, which chain-wheels are respectively

connected by the endless chains 12 12, as shown, by which arrangement a simultaneous rotary motion in either direction is imparted from the sprocket or chain wheel *w* to both truck-shafts and their wheels or rollers, so as to insure a positive motion of the machine on its rails 13 13, even if the latter should be imperfectly laid on the ground, as represented in the lower part of Fig. 1. When the truck-wheels are not connected by chains and chain-wheels, as shown, it is impossible to move the machine on its rails when the motive-truck is stuck in a hollow at the junction of two rail parts, as shown in Fig. 1, except by operating the forward truck-wheels by means of levers or handspikes, which is a very hard and tedious operation, and such difficulty is entirely obviated by the arrangement as hereinabove set forth and described.

What I wish to secure by Letters Patent, and claim, is—

1. In an excavating or dredging machine, the hollow metal crane-post, made in two parts, as described—viz., an upper detachable part, *e'*, and a lower stationary part, *e*, bolted together at *e''*, as and for the purpose set forth.

2. In an excavating or dredging machine, the combination of the truck-axles 6 8 and trucks 7 7 9 9 with chain-wheels 10 10 11 11 and the endless connecting-chains 12 12, the chain-pulley *w'''* on shaft 6, and its endless chain *w'*, actuated by drum-shaft W' and its chain-pulley *w*, as and for the purpose set forth.

3. In an excavating or dredging machine, the hoisting mechanism, as described, consisting of shaft *h'*, loose gear-wheel *h*, annular flange *h'''*, friction-shoes *k k*, guide L *l l*, levers *i''' i'''*, sleeve *i'*, rods *i i*, hub *m*, drum D, spindle *m'''*, and connecting mechanism to the treadle p^4, as set forth.

4. In an excavating or dredging machine, the herein-described swinging and propelling mechanism, consisting of shaft W', loose chain-drum F, clutch-plate *y y' y''*, loose sprocket-wheel *w w'' w''*, bevel-gear W, shaft *t*, loose bevel-gears U V U' V', adjustable cones *u v*, and connecting mechanism for its operation, as and for the purpose set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

GEORGE SOUTHER.

Witnesses:

ALBAN ANDRÉN,

HENRY CHADBOURN.