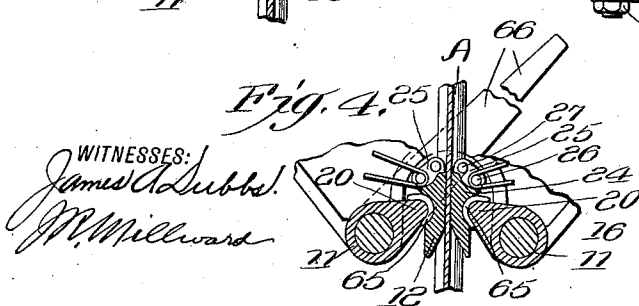
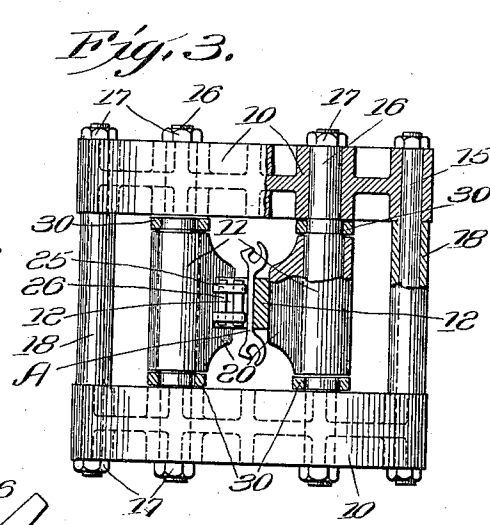
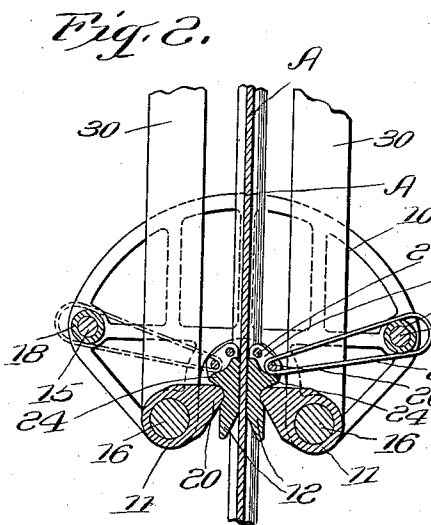
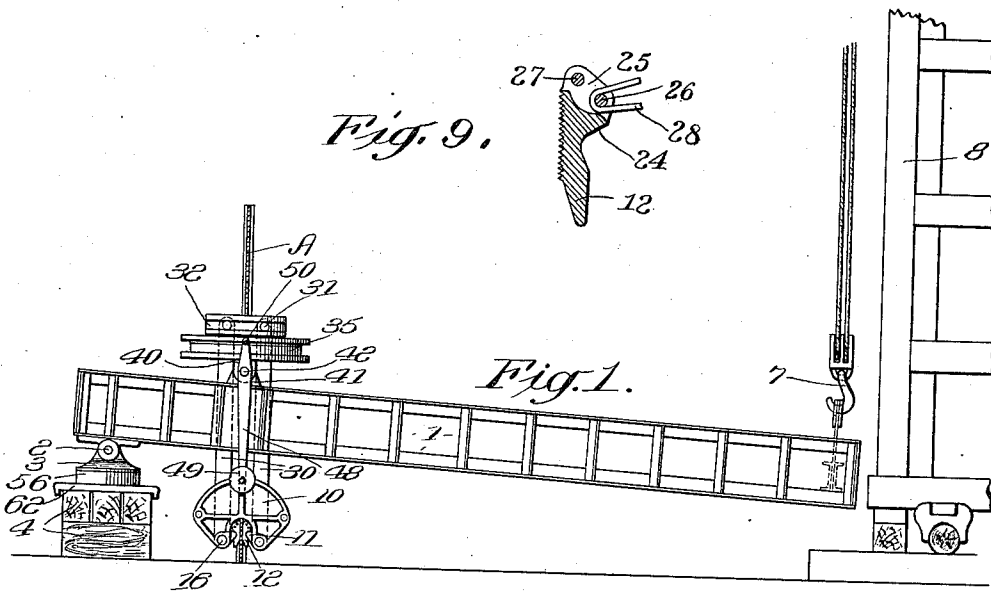


J. E. GRADY.  
 PILE PULLER.  
 APPLICATION FILED MAY 6, 1910.

1,043,223.

Patented Nov. 5, 1912.

2 SHEETS—SHEET 1.



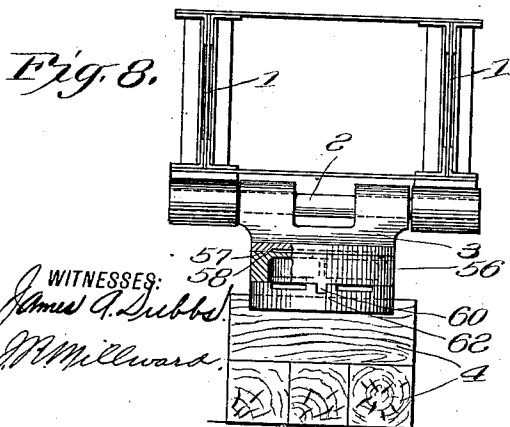
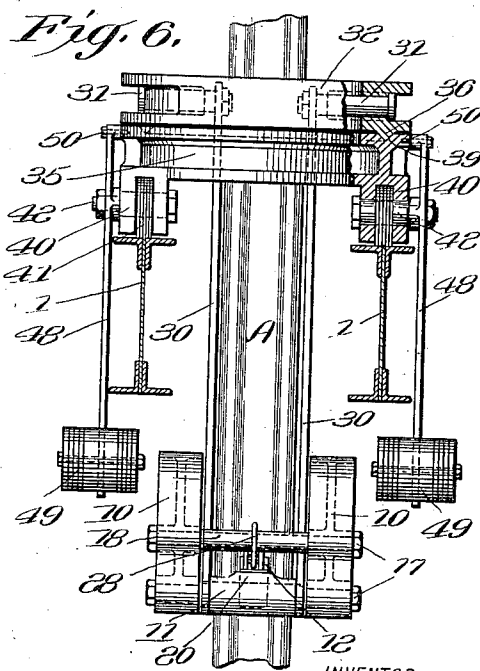
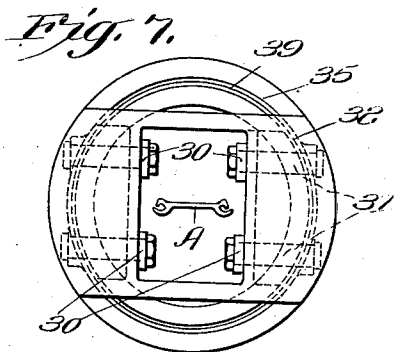
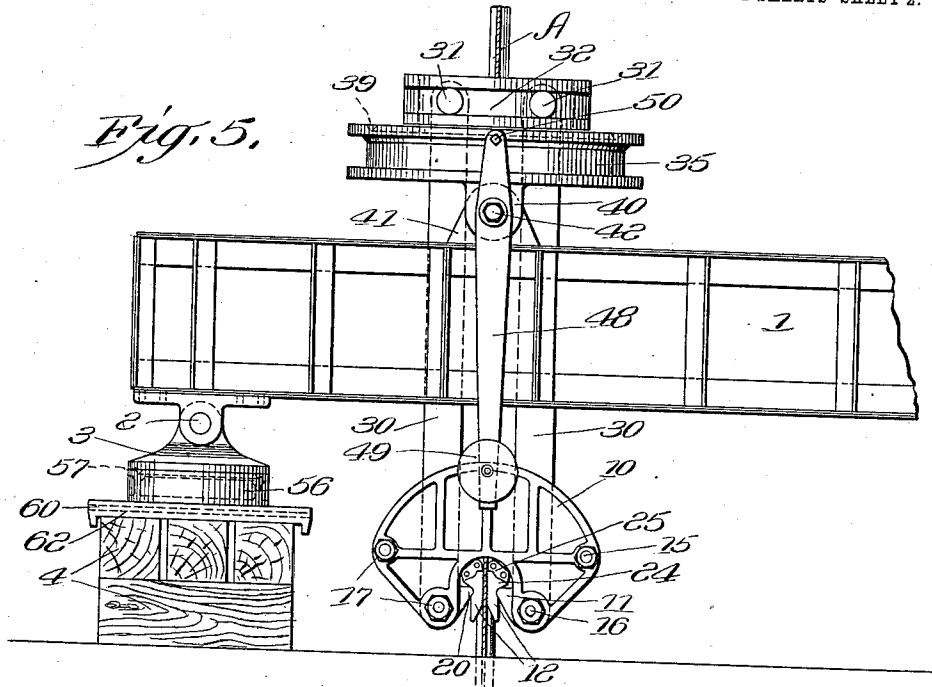
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

JOHN E. GRADY, OF CLEVELAND, OHIO.

## PILE-PULLER.

1,043,223.

Specification of Letters Patent.

Patented Nov. 5, 1912.

Application filed May 6, 1910. Serial No. 559,850.

*To all whom it may concern:*

Be it known that I, JOHN E. GRADY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Pile-Pullers, of which the following is a specification.

My invention relates to a pile puller particularly adapted for pulling steel sheet piling, and has for its object to grip the pile near the point of penetration, and to provide a suitable support for the gripping means, whereby said means adapt themselves to the varying positions of the piles, and the piles may be conveniently pulled, without undue strain on the machine.

The characteristic features of my invention are a pair of suitable jaws adapted firmly to grip the pile. These jaws are supported on some suitable support. The form of support which I prefer is a box-girder, beneath which the jaws are hung, so that they can be lowered to grip the pile near the point of penetration, to lessen the resistance and the danger of bending the pile. At one end the box girder is suitably supported; at the other end power is applied by any suitable means. At each stroke, or upward movement of the power and the girder, the pile is pulled a certain distance and is free to project through the jaws and above the girder as the pulling proceeds and above any supplementary support for the jaws, even with the longest piles. The jaws are preferably so supported as to rotate in a horizontal plane and thus adapt themselves to varying positions of the piles, and so as to swing to maintain themselves substantially vertical in all positions of the girder.

In the drawings herewith I have shown a desirable embodiment of my invention and have illustrated various desirable details and forms of parts contributing to the efficiency of the mechanism.

The reference numerals of the description indicate the same parts in all of the figures of the drawing.

Figure 1 is a side elevation of my pile puller substantially as seen in operation. Figs. 2 and 3 are respectively a central vertical cross sectional view and a plan view of the gripping mechanism enlarged parts being sectioned in the latter figure. Fig. 4 shows a portion of Fig. 2 slightly modified. Fig. 5 is an enlarged view of the important parts corresponding to Fig. 1. Fig. 6 is an

end elevation with portions broken away. Fig. 7 is a plan of the turn table mechanism supporting the yokes and gripping jaws. Fig. 8 is an end elevation showing a desirable means for supporting the box girder at its fulcrum end. Fig. 9 is a portion of Fig. 2 enlarged to show the roughened face of the gripping jaw.

Referring first to the means for carrying and operating the gripping mechanism, whereby the latter is firmly supported and operated, I show a desirable form of operative mechanism for this purpose consisting of the lever-arm or box-girder, composed of the two parallel beams 1 1, suitably connected and spaced, to permit the free passage of the pile A between as it is pulled. At its fulcrum end this lever arm is connected by the pivot 2 to the bearing 3, of cast iron, or other suitable material and structure, carried on the way 4, that may be built up from timbers temporarily, adjacent to the piling to be pulled. The other end of the lever-arm is raised and lowered by any suitable mechanism and power, for instance as indicated in Fig. 1, an ordinary system of sheaves and cables engages with the lever-arm by hook 7, and is operated from the rig 8 by a hoisting engine, or a pile driver outfit and frame with a hoisting engine may be used, or hydraulic jacks engaging directly with the lever-arm.

On the lever-arm and below the space between the beams is suspended the gripping mechanism, consisting of the yokes 10 10, the toggle arms 11 11 and the jaws 12 12. The yokes are secured together by the bolts 15 15 and 16 16 fitted with nuts 17. On the upper pair of bolts 15 are arranged the spacing collars 18, and journaled on the lower pair 16 are the toggles or toggle arms 11 having the cams 20 to engage with the jaws 12 and force them into gripping engagement with the webs of the piles. These jaws may have their contact faces serrated or roughened (as best shown in Fig. 9) and are desirably formed with shoulders 24 to rest on the cams of the toggles. As shown the jaws should be about as wide as the web to be gripped and must be thick enough to maintain a sufficient upward inclination of the toggles, to avoid all danger of their slipping by the horizontal and to insure a firm grip on the pile.

The jaws may be provided with upwardly extending ears 25 to which are fitted cross-

pins 26 and 27. The purpose of these is for connecting by links 28 the loose jaws to the yokes so that the jaws may not be lost when not in use. The upper pins 27 are merely for convenience in adjusting the jaws, for instance to adjust by means of a hook down in a trench, when it would not be convenient for the workmen to get down into the trench or excavation.

The yokes and gripping mechanism of my invention may be hung directly on the box-girder by a link on each side, which would be perfectly practical, but to increase convenience and the adaptability of the mechanism for different locations, I prefer to support the grippers so that they will turn in a horizontal plane, and swing with relation to the lever arm, to vary their position for piles in various angular relations, and to be maintained vertical as the lever-arm swings, or easily to swing for piles driven at an angle.

A form of desirable mechanism for these results is as follows. The gripping mechanism is hung by four free links 30, depending in parallel relation and pivotally connected at their upper ends by bolts 31 to the turn-table, or carrier 32 and at their lower ends to the yokes by the bolts 16. The turn-table 32 is fitted to turn on the base 35, by means of coöperating tongue and groove 36, 39 one on one part and one on the other. The base is provided with ears 40 for pivotal connection to ears 41 on the lever arm by suitable pins or bolts 42, so that it can incline itself with reference to vertical position or to the box-girder for the purposes aforesaid. To maintain in, or restore the parts to normal position, counterbalance parts must be provided which may consist of the oppositely arranged levers 48—48 fulcrumed on the pins 42 and provided on their lower extremities with the counterpoise weights 49 and recessed at their upper ends loosely to receive the bolts 50 carried in the base member. The turn-table and the base must have open centers so that the pile can freely protrude as drawn. The four yoke sustaining links may desirably depend through said openings. Also it will be understood that these links may be lengthened as conditions demand, as for instance the withdrawal of piles which have been driven in a trench.

As aforesaid other means may be adapted for sustaining and operating the gripping mechanism but I prefer to use the box-girder described and to employ therefor the universally acting fulcrum bearing shown. This bearing consists of the bearing plate 3 connected to the lever-arm by fulcrum pin 2, and provided with the annular tongue 57 fitting a coöperating groove 58 in the base 56 whereby the girder may be swung to adjust the grippers to the piles. The base is

provided on its lower surface with the spline 60 fitted to slide in a groove in the pedestal 62 thus to permit the shifting forwardly and rearwardly of the girder to insure the correct vertical alinement with the pile beams.

In the gripping mechanism of Fig. 4 there is shown the employment of curved filler plates or shims 65 fitted on the toggle cams, adapted by their interposition between the toggles 11 and the jaws 12, to maintain the proper inclination of the jaws when used to grip pile-webs of less thickness thereby providing for convenient adjustment of the gripping parts to piles of various sizes. Also in Fig. 4 I have shown a lever 66 fixed to the toggle arm to permit of manually actuating the toggle arms to throw them into or out of operative position.

My invention thus provides for the firm gripping of piles of various thicknesses at or near to their point of penetration to pull the piles on the elevation of the gripping mechanism. Upon the reversal or lowering of the mechanism the gripping parts are allowed to slide down freely on the pile-web to obtain a renewed grip; this operation is repeated with a stroke of one to three feet or more until the pile has been completely pulled. As the grippers are supported on the yokes in the manner here shown, they permit the upward passage of the piles and may be lowered to engage the pile to be pulled below the upper ends of adjoining piles; the yokes there assume a position straddling the adjoining piles, which are commonly driven with their upper ends in substantial alinement.

My turn-table permits the rotation of the grippers to greater or less extent to adjust themselves in parallel relation to piles driven at different angles. For instance in one type of piling, the alternate elements are at a right angle. The particular form of jaws rock slightly on the cams, to adjust themselves to the piles independently of the other mechanism. The swing of the arm in an arc produces a slight lateral movement of the turn-table, which would tend to bend the pile, but that is compensated for by the swinging of the yokes on the four links which at all times maintain the true relation of the yokes and turn table. The base is pivoted on the lever-arm or support, to permit the former to tilt or swing with reference to the latter in order that said base and the gripping mechanism suspended thereon may adjust themselves to piles driven at an angle to the horizontal or remain substantially horizontal as in case of vertical piles when the lever-arm is swung.

Having described my invention, what I claim is,—

1. In a pile puller, a support for the gripping mechanism consisting of two parallel beams suitably spaced and connected to—

gether, said beams resting on a pedestal at one end a source of power connected to the other end to raise and lower said second end, and a gripping mechanism to engage with the pile suspended from the support on

5 links, said gripping mechanism being arranged below the space between the beams and nearer to the pedestal end than to the power end.  
 10 2. In a pile puller, a box-girder composed of two parallel beams suitably spaced and connected, gripping mechanism for the piles suspended on the girder by links and arranged below the space between the beams, a  
 15 pedestal arranged below one end of the girder and connected thereto by a universal joint arrangement, and a source of power connected to the other end of the girder to raise that end and the gripping mechanism  
 20 when the latter is in engagement with the pile and to lower the mechanism after the stroke for a fresh grip.

3. In a pile-puller, a box-girder composed of two parallel steel beams suitably spaced and connected together, a gripping mechanism supported on the girder and depending below the same, a fixed support for one end of the girder and a source of power connected to the other end of the girder adapted  
 25 to lower said latter end and the gripping mechanism to engage with the pile adjacent to its point of penetration.

4. In a pile pulling mechanism, a box-girder supporting arm having a central open space to permit the free passage of the piles upwardly as they are drawn stroke by stroke, means to raise and lower one end of the arm, and a gripping mechanism suspended from the arm and arranged below the open space, said gripping mechanism being adapted automatically to grip the pile on being raised and adapted freely to ride down on the pile when being lowered.

5. In a pile puller, the combination with  
 45 a suitable support, of a carrier sustained on said support and adapted to turn or twist substantially in a horizontal plane on the support to bring the gripping mechanism into position to grip the piles said gripping mechanism connected to said carrier and means to raise and lower the support.

6. In a pile puller a suitable support having a central open space, a supporting base pivotally supported on the support so that the former may tilt in reference to the latter, said base having an open space registering with the open space of the support to permit free passage of the piles as they are pulled, counterbalancing means connected to the  
 55 base tending to maintain the base horizontal, gripping means suspended from the base and means to raise and lower the support.

7. In the gripping mechanism of a pile puller, a suitable support, links depending  
 65 therefrom, parallel yokes suspended on the

links, toggles journaled between the yokes, one on each side, said toggles having inwardly extending and upwardly inclined cam portions to cause gripping of the piles by their toggle action, and jaws supported  
 70 on the cams to act as supplementary means to engage with the piles by their flat inner faces, said yokes having upwardly extending recesses in their lower edges to permit straddling of the piles next the one to be  
 75 pulled.

8. In a pile puller, a suitable support, having a central open space, to permit the passage of the piles, links depending from the support, two yokes suitably connected and depending from the links, toggles having inwardly extending cam portions journaled between the yokes, jaws supported on said toggles to grip the piles, said jaws and toggles being arranged below the open space  
 80 in the support and means to raise and lower the support.

9. In a pile puller, a box-girder composed of two parallel beams suitably spaced and connected, one end resting on a fixed pedestal and the other being connected to a source of power to be raised and lowered, links depending from the box-girder, two yokes suitably connected and depending from the links, toggles having inwardly extending  
 90 cam portions journaled between the lower portions of the yokes and jaws supported on said toggles to grip the piles, said jaws and cam portions being arranged below the space between the beams.

10. In a pile puller, a suitable support, a circular base pivotally supported thereon and free to tilt, counterpoise weights secured to the base tending to maintain it horizontal, a turn table supported on the  
 105 base and free to turn thereon, said support, base and turn-table being formed with registering, central, open spaces to permit the passage of the piles, two pair of links depending from the turn-table, two yokes suitably connected and depending from the links, toggles having inwardly extending  
 110 cam portions journaled between the yokes, jaws supported on said toggles to grip the piles, said yokes having recesses in their lower portions between the toggles to permit the straddling of the piles adjacent to the one being pulled, and means to raise and lower the standard.

11. In a pile puller a box-girder composed of parallel beams suitably connected and spaced, one end resting on a fixed pedestal and the other end being free and connected to a source of power to be raised and lowered, a base pivotally supported on the  
 125 box-girder and free to tilt, counterpoise weights secured to the base tending to maintain it horizontal, a turn-table supported on the base and free to turn thereon, said base and turn-table being formed with central  
 130

open spaces arranged above the space between the beams to permit the passage of the piles, two pair of links depending from the turn-table, two yokes suitably connected and suspended by the links, toggles having inwardly extending cam portions journaled between the lower portions of the yokes and jaws supported on said toggles to grip the piles, said jaws and cam portions being arranged below said central open spaces.

12. In a pile puller, the combination with a suitable support, of links depending therefrom, a pair of parallel yokes connected by upper and lower pairs of cross bolts and suspended on the links by means of the lower bolts, toggles journaled on the lower bolts and having cams inwardly extending and upwardly inclined, said yokes having upwardly extending recesses in their lower portions to permit the yokes to straddle piles adjacent to the particular pile being pulled, jaws having inner, flat, roughened surfaces to engage with the pile web and upper shoulders on their outer surfaces to engage with the cams, a pair of upwardly extending parallel ears on each jaw, two pair of pins extending between each pair of ears and a link engaging with one pin on each jaw and with one of said upper yoke bolts to connect the jaws loosely to the yokes, substantially as described and shown.

13. In a pile puller, a box-girder composed of parallel beams suitably spaced and secured together, said box-girder being supported at one end so that it can be swung vertically by power applied at the other end, opposite ears on the upper portions of the respective beams, a circular base having corresponding ears on its lower portion, bolts pivotally connecting the base to the girder by means of the two pairs of ears, counterbalance arms journaled on the beam ears and pivotally connected to the base, weights on the lower ends of said arms, a flat substantially circular turn-table fitted to rotate on the base, said base having a circular groove on its upper surface and the turn-table a flange on its lower surface fitting the groove, said base and turn-table having open centers to correspond with the space between the beams, and links depending from the turn-table and gripping mechanism supported on the links below the open centers.

14. In a pile puller a box-girder composed of parallel beams suitably spaced and secured together, said box-girder being supported at one end so that it can be swung vertically by power applied at the other end, opposite ears on the upper portions of the respective beams, a circular base having corresponding ears on its lower portion, bolts pivotally connecting the base to the girder by means of the two pairs of ears, counterbalance arms journaled on the beam ears

and pivotally connected to the base, weights on the lower ends of said arms, a flat substantially circular turn-table fitted to rotate on the base, said base having a circular groove on its upper surface and the turn-table a flange on its lower surface fitting the groove, said base and turn-table having open centers to correspond with the space between the beams, two pair of parallel links correspondingly arranged and pivotally attached to the interior of the turn-table to depend through the base opening and the girder space, a pair of parallel yokes connected by upper and lower pairs of cross bolts and suspended on the links by means of the lower bolts, toggles journaled on the lower bolts and having cams inwardly extending and upwardly inclined, said yokes having upwardly extending recesses in their lower portions to permit the yokes to straddle piles adjacent to the particular pile being pulled, jaws having inner, flat, roughened surfaces to engage with the pile web and upper shoulders on their outer surfaces to engage with the cams, a pair of upwardly extending ears on each jaw, two pair of pins between each pair of ears and a link engaging with one pin on each jaw and with one of said upper yoke bolts, to connect the jaws loosely to the yokes, substantially as described and shown.

15. In a pile puller mechanism, means for supporting, raising, lowering and adjusting the gripping mechanism having in combination, a fixed standard or way, a metal pedestal supported thereon and having a longitudinally extending groove, a metal base supported on the pedestal and having a tongue fitting said groove to permit longitudinal movement of the base to or from the pile, said base having an annular groove on its upper surface, a metal bearing plate supported on the base and having an annular tongue fitting the annular groove, a box-girder pivotally fulcrumed, at one end, to the upper portion of the bearing plate by a fulcrum pin, and a source of power, connected to the opposite, or free, end of the girder to raise and lower said free end.

16. In a pile pulling mechanism, a suitable support having a central open space to permit the free passage of the pile upwardly as it is being pulled, a source of power suitably connected to the support to raise and lower the latter, and a gripping mechanism suspended from the support and arranged below the open space to engage with the pile adjacent to the point of penetration.

17. In a device of the character described a pair of substantially parallel, opposed gripping jaws, a turn table or carrier for said jaws, means to connect the jaws to said carrier, means to force the jaws together to grip a beam, and means to support the carrier so that it may turn in a substan-

tially horizontal plane to permit the jaws to adjust themselves in parallel relation to the beam.

18. In a device of the character described, a turn table, or carrier, having a central opening, a pair of substantially parallel opposed gripping jaws, means connected to the carrier to support the jaws therefrom and below the opening, and means to force the jaws toward each other to grip a beam, said carrier being arranged to be free to turn in a substantially horizontal plane permitting the jaws to arrange themselves in parallel relation to the beam.

19. In a pile puller the combination with a suitable support, of a pair of substantially parallel, opposed gripping jaws, means to suspend the jaws below the support so that they will swing, or tilt, in reference to the latter, and means to force the jaws together to grip the pile, the parts of the support being spaced above the jaws and permit a free passage of the pile upwardly as it is being pulled.

20. In a pile puller, the combination with a suitable support, of a pair of substantially parallel opposed gripping jaws, means to suspend the jaws below the support so that they will both twist in a horizontal plane to adjust themselves to piles in different angular relations to each other and will swing, or tilt, in reference to the support to adjust themselves to piles driven in various angular relations to the horizontal, and means to force the jaws together to grip the pile, the parts of the support being spaced above the jaws to permit a free passage of the pile as it is being pulled.

21. In a pile puller, a suitable support, links suitably connected to the support and arranged to depend below the same, a pair of yokes arranged parallel and suitably spaced to permit the piles when pulled to pass up between them, said links being pivotally connected to the yokes at the lower portions of the latter, and toggles journaled in the lower portion of the yokes to effect gripping of the pile when the support and connected parts are raised.

22. In a pile puller, a suitable support, links suitably connected to the support and arranged to depend below the same, a pair of yokes arranged parallel and suitably spaced to permit the piles when pulled to pass up between them, said yokes being pivotally

connected at their lower points to the links, and means to grip the pile connected also to the yokes at the lower points of the latter.

23. In a pile-puller, a suitable carrier, a pair of jaws carried directly on the carrier and adapted to grip the pile between them, the parts of said carrier being arranged to permit the pile when pulled to pass freely up through the carrier, means to support the carrier and to lower and raise it for pulling the pile step by step.

24. In a pile puller, a pair of side-pieces or yokes, means to maintain the side-pieces parallel and spaced to permit the pile when pulled to pass between them, jaws carried on the side-pieces and adapted to grip the pile, and means to lower and raise the side-pieces.

25. In a pile puller adapted for pulling metal sheet-piling, a suitable carrier, jaws carried on said carrier and adapted to engage with opposite sides of the pile web, and means to lower and raise the carrier, the parts of the carrier being spaced to permit the pile when being pulled to pass freely up through the carrier, and the jaws being adapted to grip the sides of the pile between them when being raised but to slide freely over the pile when being lowered.

26. A mechanism of the character described comprising a suitable support adapted to be lowered and raised, a carrier supported on the support to adjust itself freely thereon, and jaws depending from the carrier and adapted to engage with piles arranged at varying angles to the vertical.

27. In a puller adapted to pull piles and the like step by step, the combination with a lever suitably supported and fulcrumed of a jaw carrier supported on the lever adjacent one end thereof, a source of power connected to the lever and adapted to lower and raise the jaw carrying end, and jaws on said carrier to engage with the pulled article.

28. A puller adapted to pull piles and the like comprising a suitable support a jaw carrier carried on the support, jaws on the carrier to engage with the pile and means to lower and raise the support and the carrier.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN E. GRADY.

Witnesses:

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J. A. DUBBS.