Nov. 21, 1933. F. R. ZIMMERMAN ET AL 1,935,898

GRAPPLE

Filed Aug. 8, 1932 2 Sheets-Sheet 1

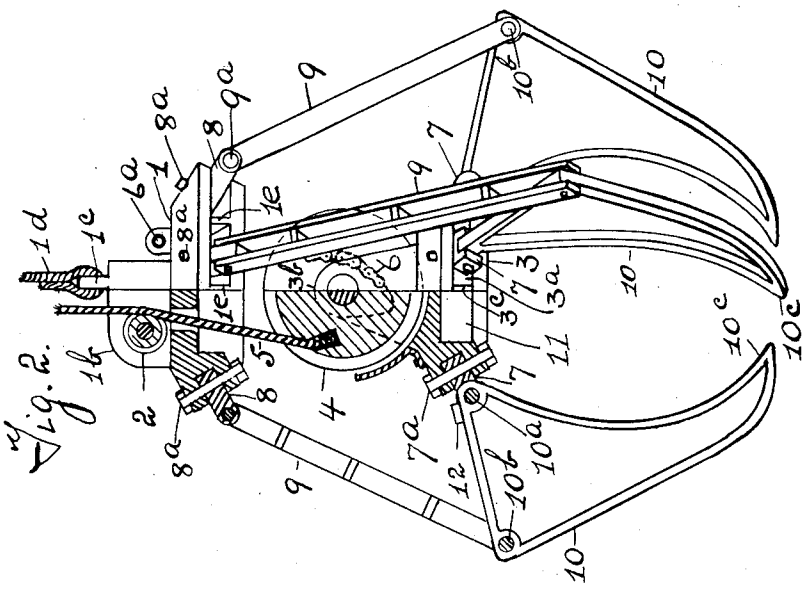


Fig. 2.

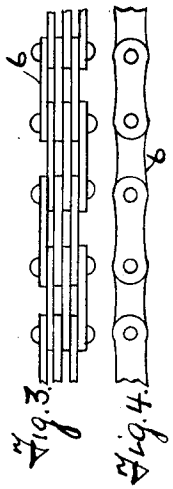


Fig. 3.

Fig. 4.

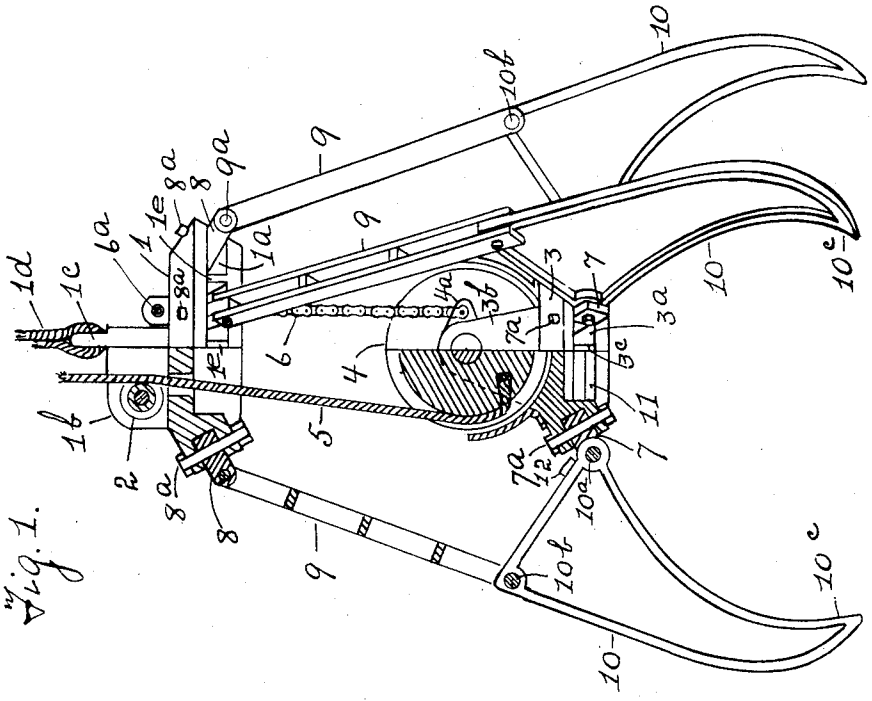


Fig. 1.

INVENTORS
Frank R. Zimmerman
Ira J. Lyons
By- James T. Watson
ATTORNEY

Nov. 21, 1933. F. R. ZIMMERMAN ET AL 1,935,898

GRAPPLE

Filed Aug. 8, 1932 2 Sheets-Sheet 2

Fig. 5

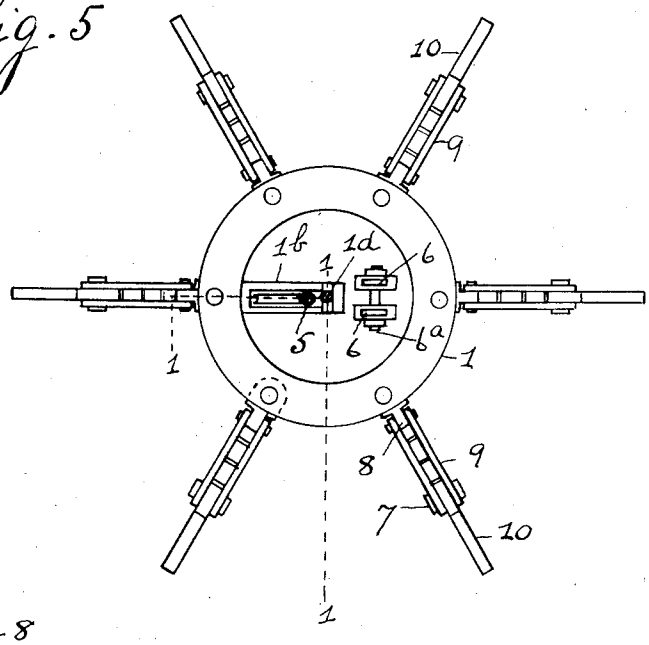


Fig. 6

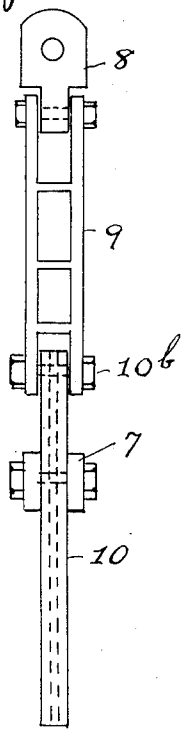
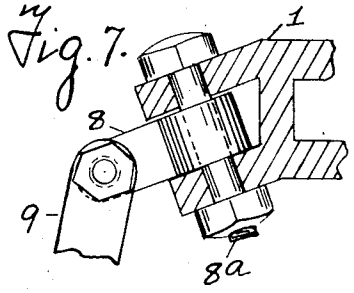


Fig. 7.



INVENTORS

Frank R. Zimmerman

Ira J. Lyons

By James T. Watson

ATTORNEY

Patented Nov. 21, 1933 1,935,898

UNITED STATES PATENT OFFICE

1,935,898

GRAPPLE

Frank R. Zimmerman, Duluth, Minn., and Ira J. Lyons, Grand Rapids, Mich.

Application August 8, 1932. Serial No. 627,836

6 Claims. (Cl. 294—111)

Our invention relates to grapples and has for its object the provision of an improved structure of that character, for seizing and lifting stone, or for such other or additional purposes as it may be adapted to serve. One of the objects of our invention is to provide a grapple having grab hooks adapted to swing a limited distance in a horizontal or sidewise direction independently of each other as well as to rise or fall collectively, thus being enabled to better accommodate themselves to irregular contours of the load and avoid damaging side strains. With this and other objects in view, our invention consists of the structures, combinations, and arrangements of parts hereinafter described and claimed.

In the drawings, Fig. 1 is an elevation of our invention in open or load receiving position, partly in vertical section on the lines 1—1—1 of Fig. 5. Fig. 2 is an elevation partly in section similar to that shown in Fig. 1, except that the invention is shown in closed or load retaining position as when suspended by the hereinafter described operating cable. Fig. 3 is a fragmentary front view of the preferred form of the hereinafter described leaf link chain. Fig. 4 is a fragmentary side view of said leaf link chain. Fig. 5 is a top plan view of our said invention. Fig. 6 is a front elevation of one form of the hereinafter described head links, foot links, operating bars and grab hooks. Fig. 7 is an elevational view partly in section of one of the head links and its attaching means.

In the drawings, 1, is a head plate, in the periphery of which is preferably formed a horizontally disposed annular groove 1^a, the floor and roof of which are preferably inclined upwardly and inwardly toward the vertical axis of said plate, said floor and roof forming supporting lips for hereinafter described head links.

Erected upon said plate, is an axle bearing 1^b, of any suitable structure, preferably integral with said plate and adapted to support the axle of a guide or anti-friction wheel 2; said plate being apertured forward of said wheel for the passage of an operating cable 5. The plate 1 is also provided with a suspending eye 1^c of any suitable structure, to which is attached a suspending cable 1^d.

Below said head plate, is a foot plate 3, preferably of shorter horizontal diameter than said head plate. In the periphery of said foot plate is formed a horizontally disposed annular groove 3^a, the floor and roof of which are preferably inclined upwardly and inwardly toward the vertical axis of said foot plate, said floor and roof of said foot plate forming supporting lips for hereinafter described foot links.

Upon said foot plate is erected a bearing 3^b of any suitable structure, adapted to support a sheave or bull wheel 4, which is adapted to engage said operating cable 5, which cable extends upwardly and loosely through said aperture in said head plate, and thence directly or indirectly to an external winding drum, not shown but well known to the art.

One or more chains or cables 6, of any suitable structure, preferably of the leaf-link chain type shown in Figs. 3 and 4, are attached at one end to said head plate in any suitable manner and by any suitable means, as at 6^a and are adapted to be engaged by, or are connected to said wheel 4 in any suitable manner or by any suitable means, as by pinning them to respectively corresponding arms, as 4^a, extending radially from the hub of said wheel 4.

Each of a plurality of foot links 7, 7, of any suitable structure, is pivoted by a vertically disposed pivot 7^a to said foot plate, and bears upon said plate and extends radially outward and preferably at a downward inclination therefrom. Said links are preferably six in number and are spaced from each other and distributed around the periphery of the supporting foot plate.

Each of a plurality of head links 8, 8, of any suitable structure is secured at one end to said head plate by a vertically disposed pivot 8^a and bears upon said head plate and extends radially outward and preferably at a downward inclination therefrom. Said head links are preferably six in number and are spaced from each other and are distributed around the periphery of said head plate in radial vertical planes corresponding substantially to the radial vertical planes in which the foot links are positioned.

Depending operating arms 9, 9 are connected at their upper ends by horizontally disposed pivots 9^a to the outer ends of said head links, respectively.

Grab hooks 10, 10, of modified bell-crank shape, are connected by horizontally disposed pivots as at 10^a to the outer ends of said foot links, and are connected by horizontally disposed pivots at their heels, as at 10^b, to the lower ends of said operating arms, respectively.

The toes, or free ends 10^c of said grab hooks extend downwardly and inwardly to engage the load.

The vertically pivoted ends of said head links preferably extend into the peripheral groove in said head plate and bear on the floor thereof

and the vertically pivoted ends of said foot links preferably extend into the peripheral groove in said foot plate and bear on the floor thereof.

Partitions or stops 1^e are preferably formed in the groove 1^a between the respective links therein, to limit the side swing of said links and also to strengthen the head plate.

Partitions or stops 3^c are also preferably formed in the groove 3^a between the link ends therein, to limit the side swing of said links and also to strengthen the foot plate.

The downward inclination of the several links facilitates the side swing of the links, operating bars and hooks, and the return of the links and hooks to normal radial position after relief from any load, or other strain which has swung or pressed them sidewise.

The bottom of the foot plate is preferably recessed, within which recess any desired number of weights 11, may be positioned as may be required to enable said foot plate and wheel 4 to rapidly overhaul said cable 5 when the grapple is returning to open position after a load has been dropped.

Stops 12 of any suitable number or structure are provided at any suitable locations for directly or indirectly preventing the heels of the grab hooks from rising too far or swinging inward of lines projected through their respective head and foot link supports.

In operation, when our invention is suspended by its cable 1^d and its cable 5 is slack, the foot plate drops a short distance, thus depressing the shank ends of the hooks and spreading their toes to wide open load-receiving, or load releasing position.

When the cable 1^d is slack and lifting strain is put upon the operating cable 5, the head plate drops a short distance, thus through the operating arms depressing the heels of the grab hooks and forcing their toes inwardly to load grappling position. If a prominence on the load tends to pry one or another of the hooks sidewise, such hook may yield and thus avoid damaging strain, which is a highly important and valuable feature of our invention.

What we claim is—

1. The combination with a head plate, of a foot plate; radially disposed head links mounted upon said head plate and adapted to swing sidewise thereon; radially disposed foot links mounted upon said foot plate and adapted to swing sidewise thereon; grab hooks pivotally secured to said foot links, respectively, by horizontally disposed pivots; operating bars pivotally connected to said head links, respectively, by horizontally disposed pivots and also connected to said grab hooks, respectively, by horizontally disposed pivots; means for suspending said head plate, and means for suspending said foot plate when the first said means is slack.

2. The combination with a head plate, of a foot plate; downwardly and outwardly inclined head links mounted on said head plate and adapted to swing sidewise thereon; downwardly and outwardly inclined foot links mounted on said foot plate and adapted to swing sidewise thereon; depending grab hooks secured to the outward ends of said foot links, respectively, by horizontally disposed pivots; operating arms secured to the outward ends of said head links, respectively, by horizontally disposed pivots; said arms being also secured to said grab hooks, respectively, by horizontally disposed pivots; means for suspending said head plate, and means for suspending said foot plate when the first said suspending means is slack.

3. A grapple comprising a head plate, a foot plate, a plurality of grab hooks, links, pivotes connecting said links to said foot plate, pivots connecting said links to said hooks, operating arms, pivots connecting said arms to said hooks, other links, pivots connecting said other links to said head plate, pivots connecting said other links to said arms, means connected to said head plate for suspending the same, and means connected to said foot plate for suspending the same when the first said suspending means is idle.

4. A grapple comprising a head plate, a foot plate, a plurality of grab hooks, links, horizontally disposed pivots connecting said links to said hooks, vertically disposed pivots connecting said links to said foot plate, operating arms, horizontally disposed pivots connecting said arms to said hooks, other links, horizontally disposed pivots connecting said other links to said arms, vertically disposed pivots connecting said other links to said head plate, means attached to said head plate for suspending the same, and means attached to said foot plate for suspending the same when the first said suspending means is idle.

5. The combination with a head plate, of a foot plate; radially disposed head links mounted upon said head plate and adapted to swing sidewise thereon; stops for limiting the side swing of said links; radially disposed foot links mounted upon said foot plate and adapted to swing sidewise thereon; stops for limiting the side swing of said foot links; grab hooks secured to said foot links, respectively, by horizontally disposed pivots; operating bars connected to said head links, respectively, by horizontally disposed pivots and also connected to said grab hooks, respectively, by horizontally disposed pivots; means for suspending said head plate, and means for suspending said foot plate when the first said suspending means is idle.

6. The combination with a head plate, of a foot plate of shorter diameter than said head plate; head links mounted upon said head plate and extending radially thereof and adapted to swing sidewise thereon; foot links mounted upon said foot plate and extending radially thereof and adapted to swing sidewise thereon; grab hooks secured to said foot links, respectively, by horizontally disposed pivots; operating bars secured to said head links by horizontally disposed pivots and also secured to said grab hooks, respectively, by horizontally disposed pivots; means for suspending said head plate, and means for suspending said foot plate when the first said suspending means is slack.

FRANK R. ZIMMERMAN.
IRA J. LYONS.