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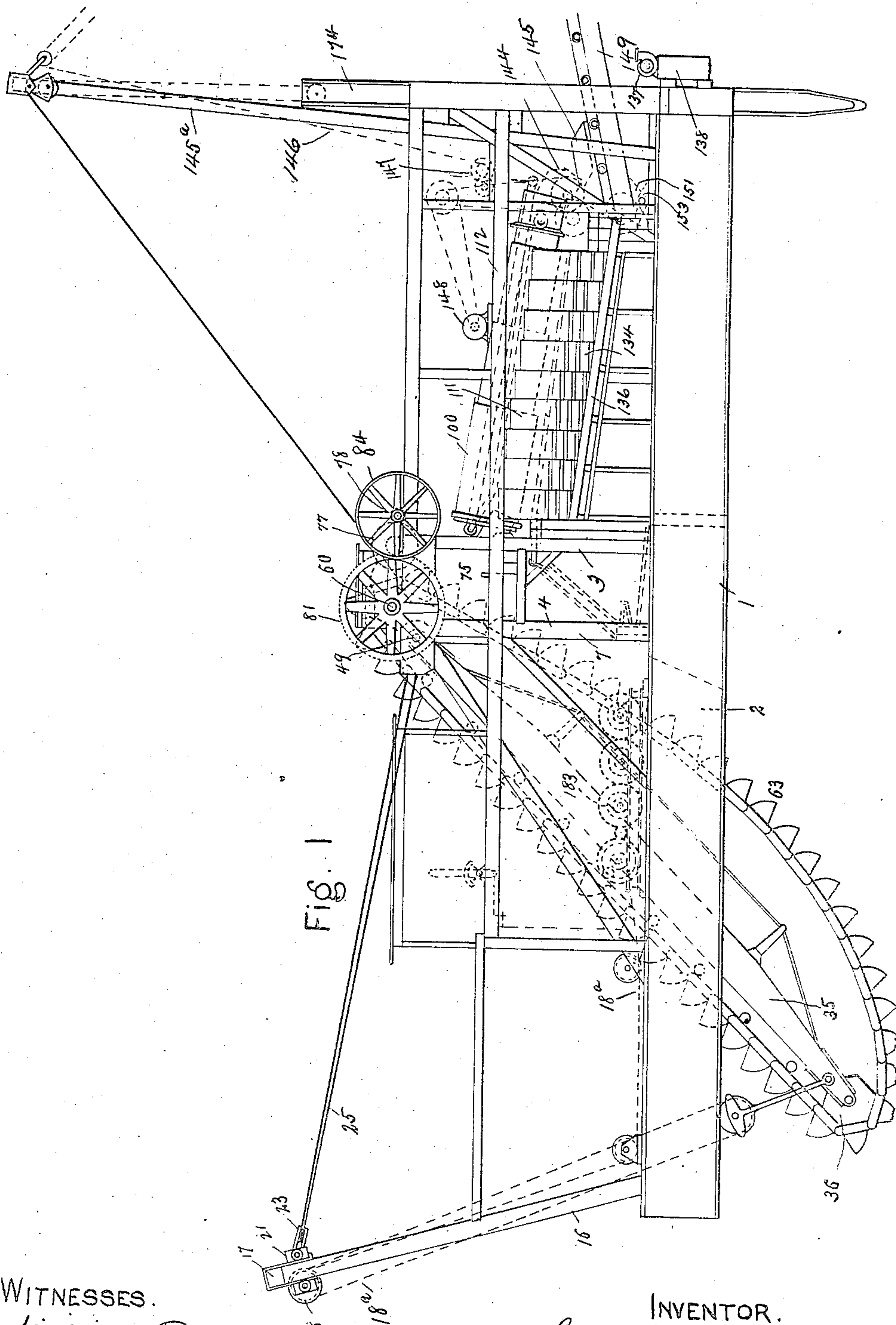
G. W. KING.

PATENTED JUNE 16, 1908.

DREDGE.

APPLICATION FILED MAY 26, 1905.

7 SHEETS—SHEET 1.



WITNESSES.

William F. Bauer <sup>20</sup>  
Irene Miller.

INVENTOR.

George W. King

Best. A. Tardieu  
et al.



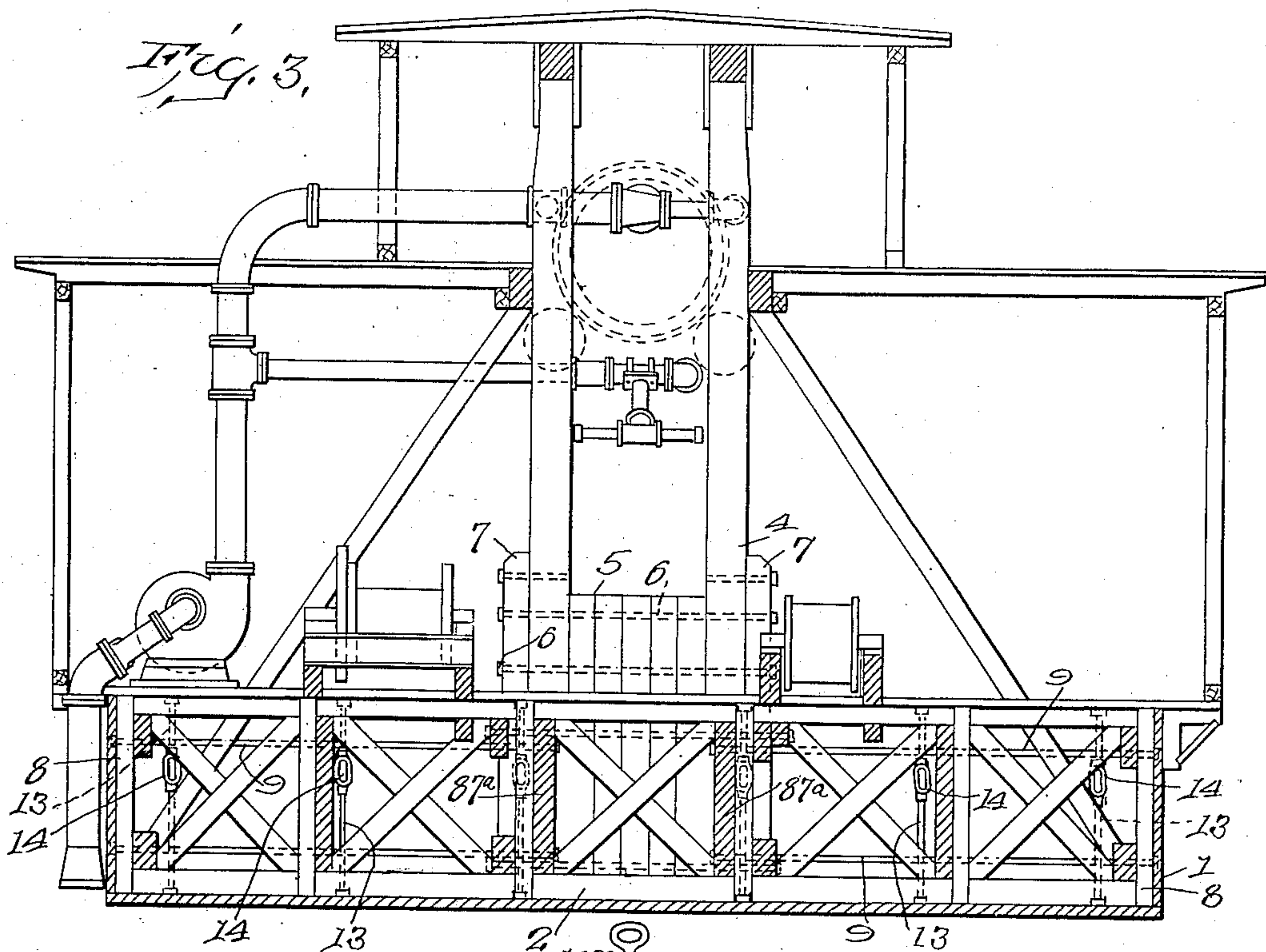
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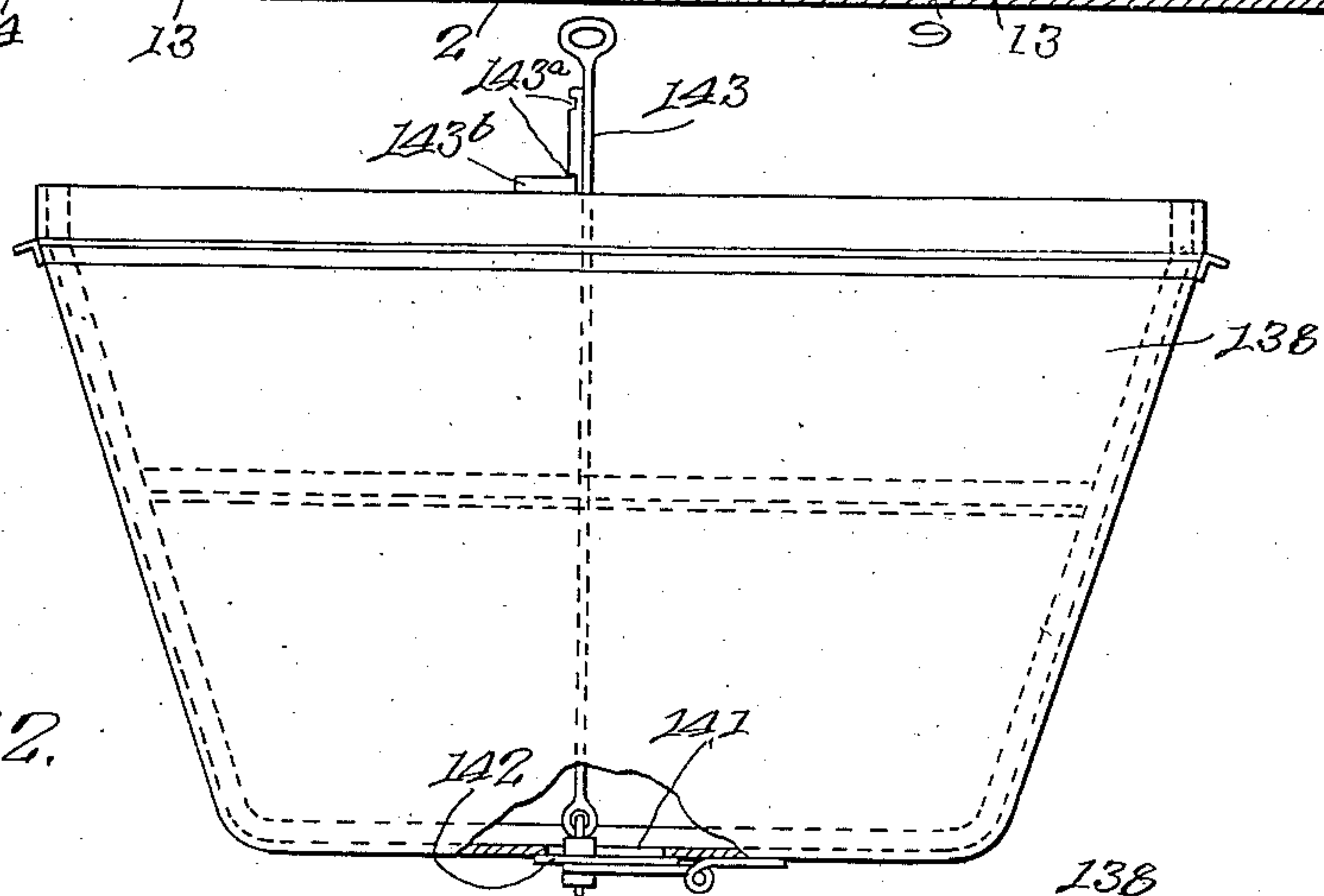
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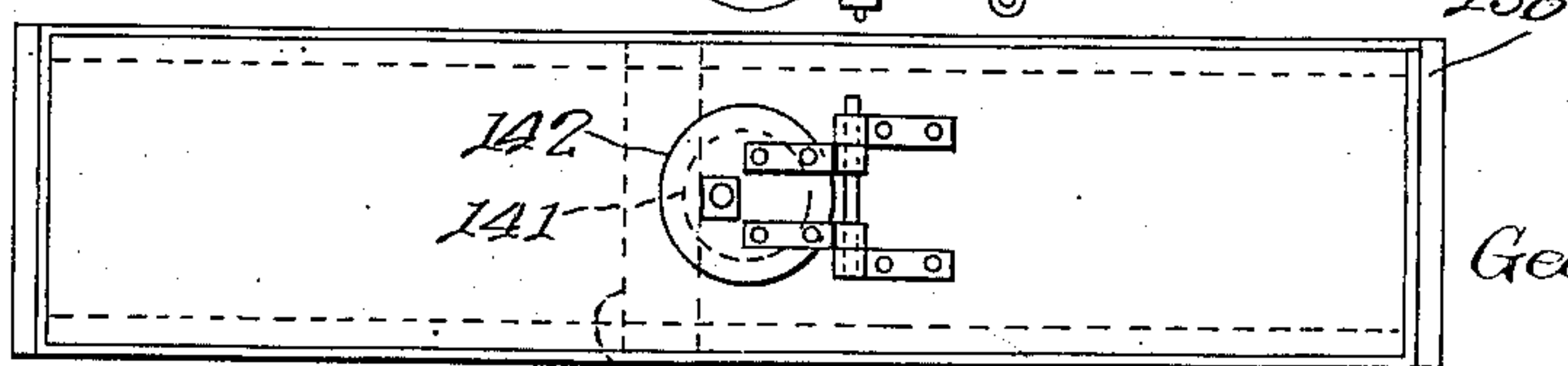
7 SHEETS—SHEET 3.



*Fig. 11.*



*Fig. 12.*



Witnesses

*G. Howard Walmsley,  
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7 SHEETS—SHEET 4.

Fig. 4.

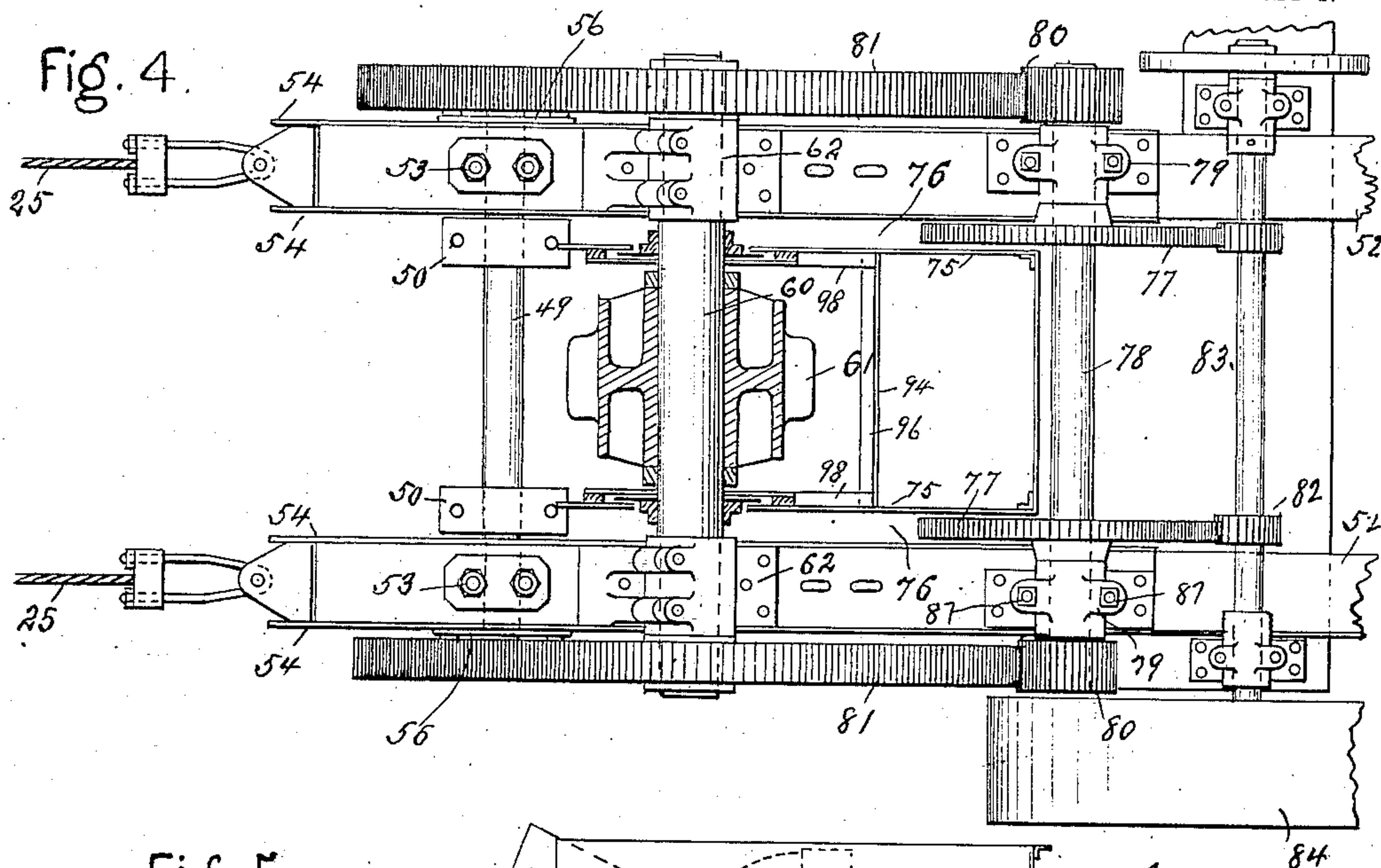
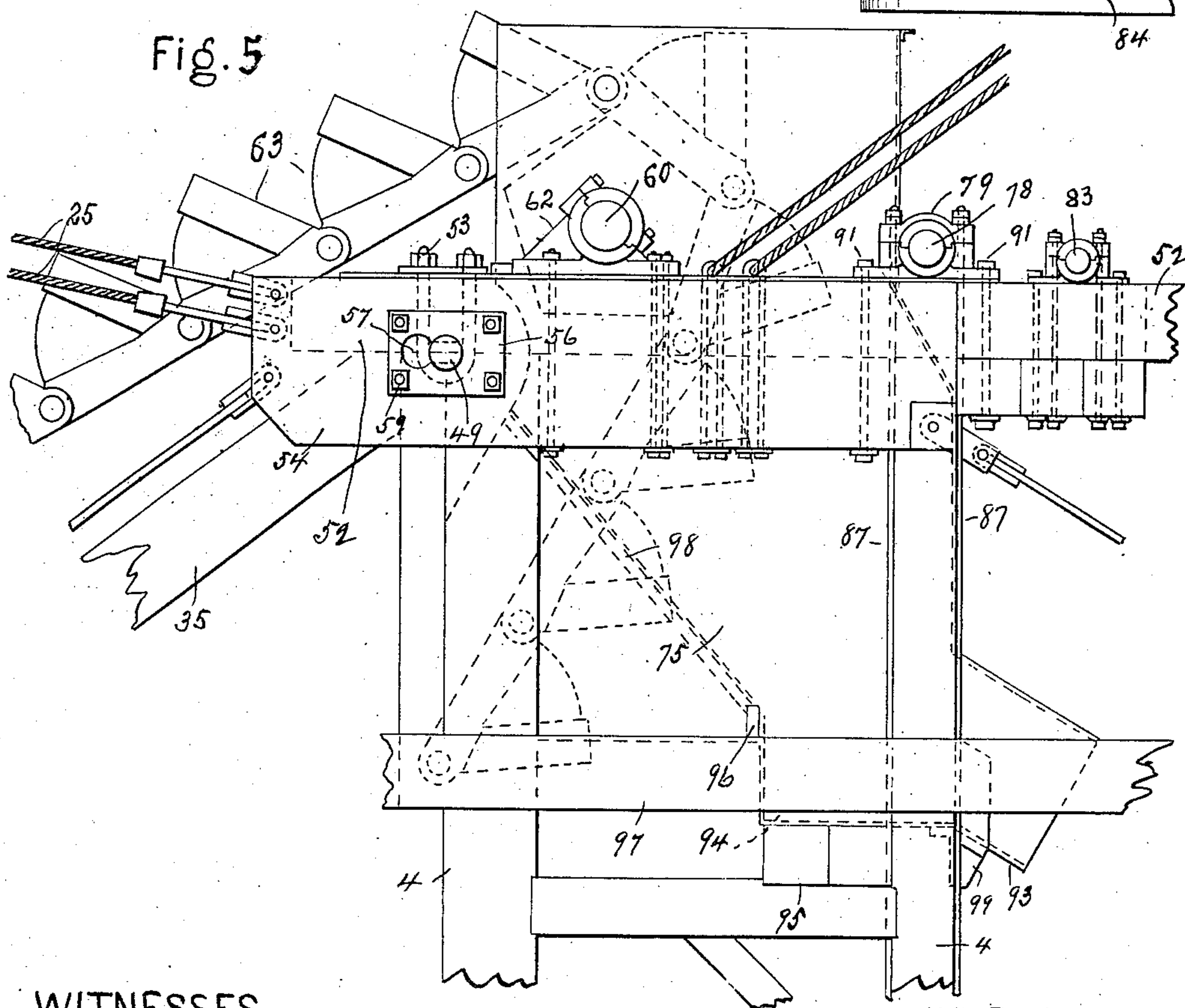


Fig. 5.



WITNESSES.

William D. Bauer  
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INVENTOR.

George W. King  
By *H. A. Paulsen*  
*att'y*

No. 890,773.

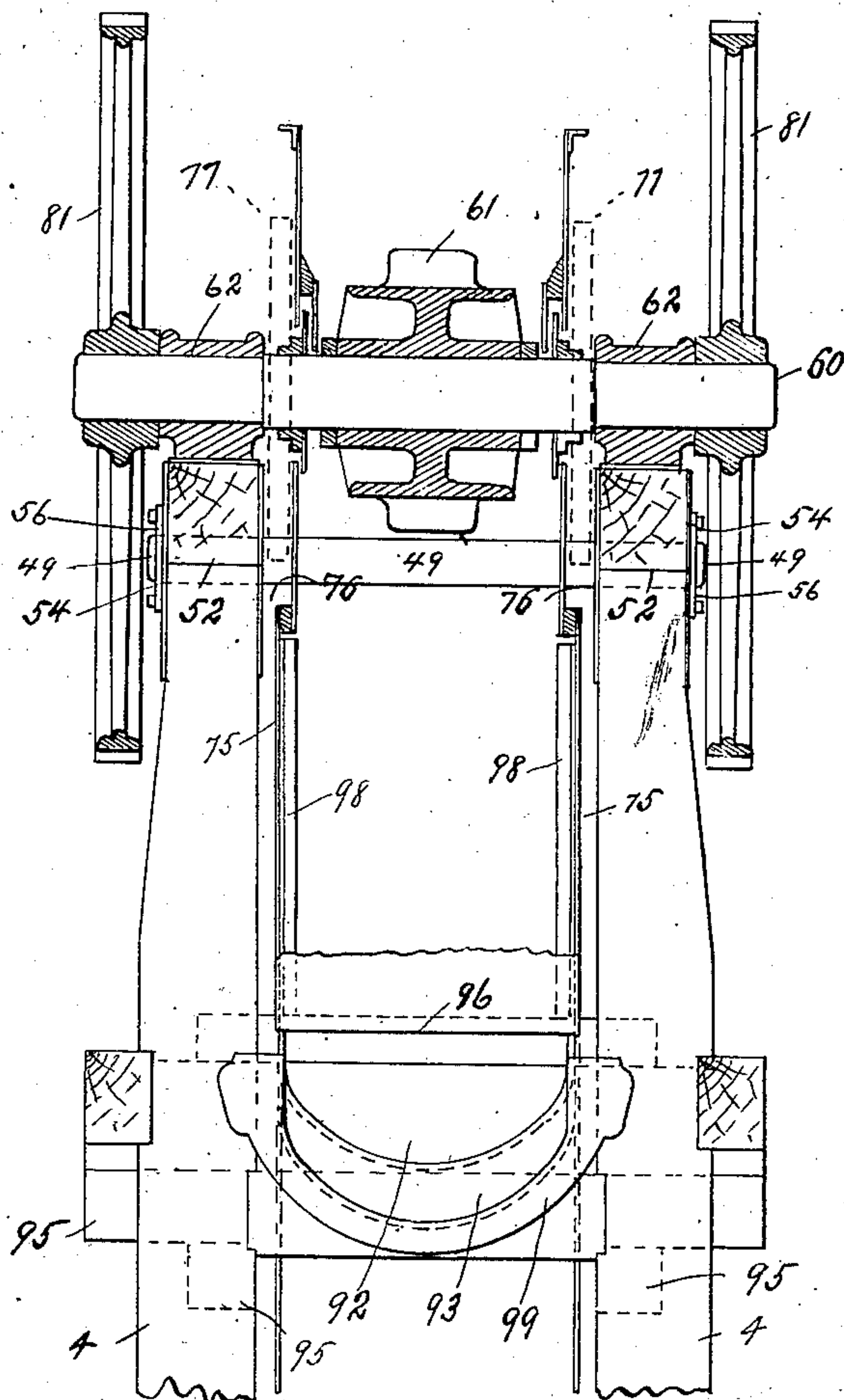
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7 SHEETS—SHEET 5.

FIG. 6.



WITNESSES.

*William F. Bauer.*

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INVENTOR.

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No. 890,773.

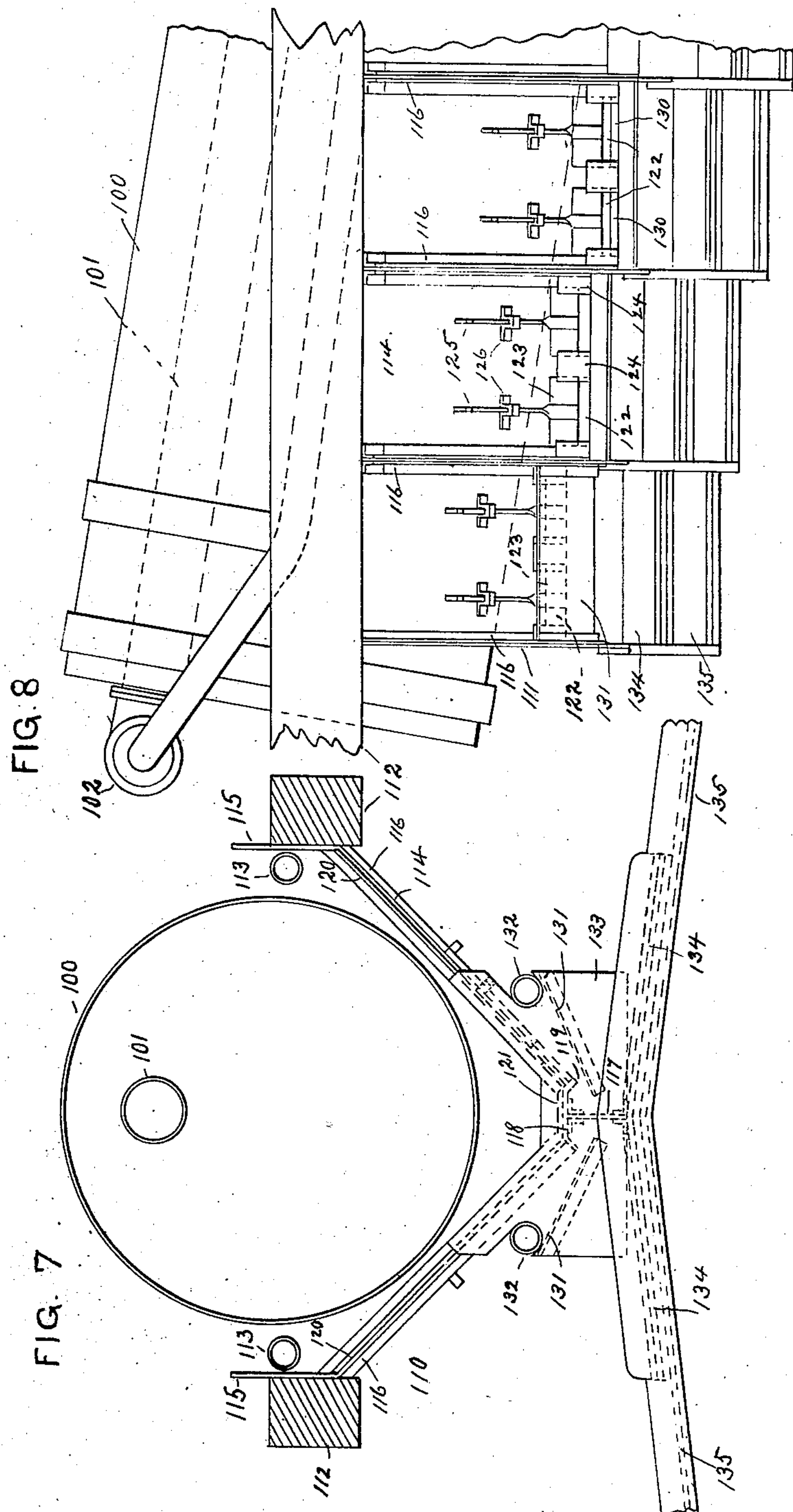
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G. W. KING.

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7 SHEETS—SHEET 6.





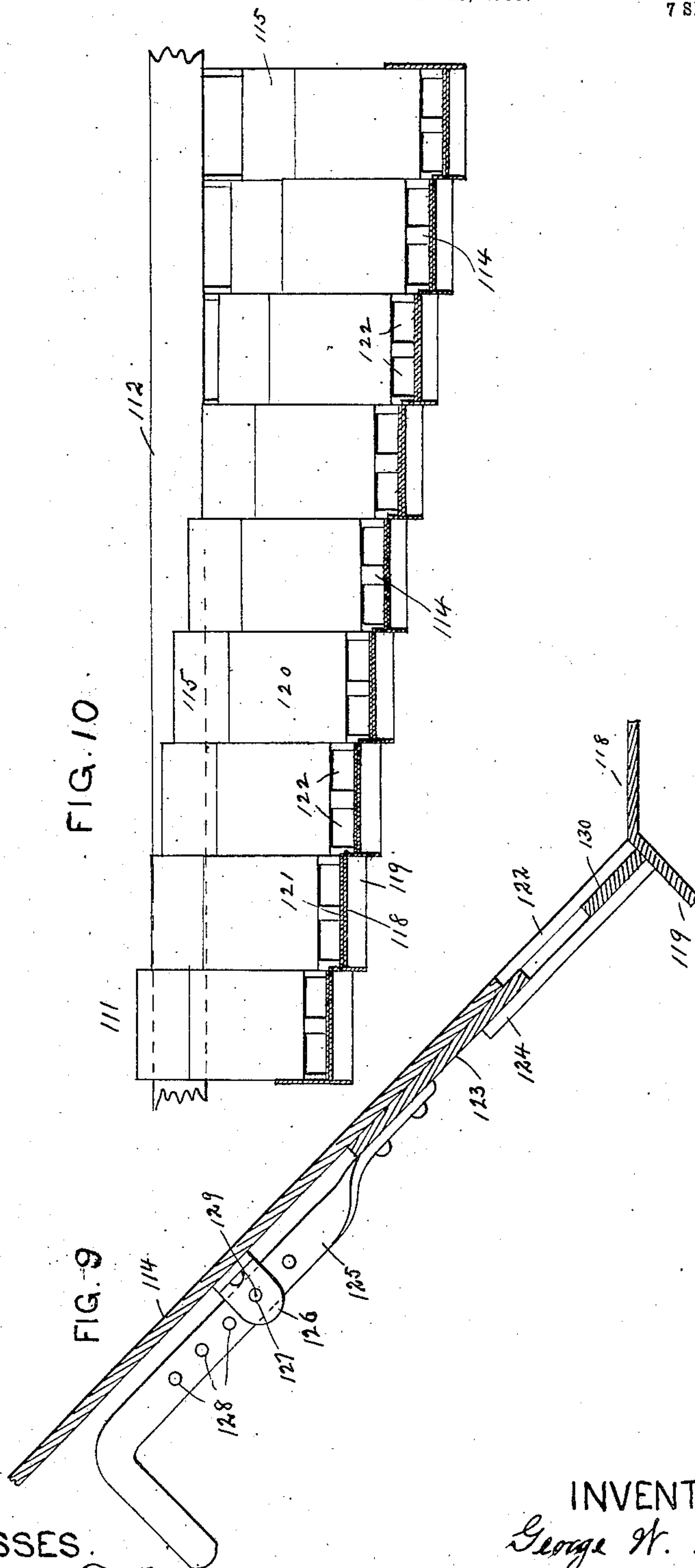
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G. W. KING.  
DREDGE.

APPLICATION FILED MAY 26, 1905.

7 SHEETS—SHEET 7.



WITNESSES.  
William F. Bauer  
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INVENTOR.  
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Atty.

# UNITED STATES PATENT OFFICE.

GEORGE W. KING, OF MARION, OHIO, ASSIGNOR TO THE MARION STEAM SHOVEL COMPANY,  
OF MARION, OHIO, A CORPORATION OF OHIO.

## DREDGE.

No. 890,773.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed May 26, 1905. Serial No. 262,378.

*To all whom it may concern:*

Be it known that I, GEORGE W. KING, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Dredges, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to dredges, and more particularly to dredges known as mining dredges, although features thereof are applicable to dredges for other purposes.

Mining dredges are used for the purpose of lifting the soil, rocks and other material forming the bed of a body of water, treating it to remove the gold or other valuable metal therefrom, and disposing of the waste material after treatment.

It is the object of my present invention to provide a dredge of this character embodying certain structural features hereinafter described, whereby, in a general way, the structure may be rendered stronger and more durable, and its operative efficiency increased.

The object of my present invention is to provide an improved apparatus for effecting the separation of the gold from the material after the primary screening, so organized as to be readily adapted to the varying conditions which are met in practice, and of a high efficiency in effecting the desired separation; and also to provide an improved construction of the sump used under certain conditions to receive the waste sand and supply the same to a sand pump by which it is conveyed to a distant point of discharge, the construction being such as to provide means for relieving the pump when clogged and to provide means for repriming the pump when it has lost its priming.

The particular features of novelty will be hereinafter more fully described and then particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a structure embodying my invention in one form; Fig. 2 is a plan view of the same; Fig. 3 is a transverse sectional view, taken on the line *t t* of Fig. 2 and looking in the direction of the arrows; Fig. 4 is a plan view of the upper part of the main gauntree frame and the mechanism mounted thereon; Fig. 5 is a side elevation of the

same, partly in section; Fig. 6 is a transverse sectional view, taken on the line *ww* of Fig. 5 and looking in the direction of the arrows; Fig. 7 is a transverse sectional view of the separating apparatus; Fig. 8 is a side elevation of a portion of the same; Fig. 9 is an enlarged detail sectional view through one of the sections of the separator, taken on the line *xx* of Fig. 8, showing a dam plate in position therein; Fig. 10 is a central longitudinal sectional view of the distributing hopper, detached; Fig. 11 is an elevation partly in section, of the sump; Fig. 12 is a bottom plan view of the same.

The accompanying drawings illustrate a dredge embodying my invention in one form.

The general structure and mode of operation of these dredges is well known and requires no description, and I shall therefore proceed to describe in detail the several features of novelty to which I have already referred.

In these drawings the hull of the dredge is represented by the reference numeral 1 and is provided with a crotch or well-opening 2, extending from the central portion of the hull to and through the front end thereof. At the rear end of this well-opening there is located the main gauntree frame 3, which supports the ladder of the endless chain of excavating buckets and the mechanism whereby it is driven. This chain of excavating buckets and its coöperating mechanism may be of any suitable construction, but I prefer that shown, described and claimed by me in my pending application filed June 18, 1906, Ser. No. 322,248, for excavators. The gauntree frame 3 also supports a housing or pocket 75, preferably of sheet metal, into which the buckets discharge their contents. Preferably this housing is bolted directly to the inner sides of the gauntree frame members.

The housing 75 is provided at its rear lower portion with a discharge opening 92 and a dump chute 93, to be hereinafter more fully described, by means of which the material is discharged into the primary separator or grizzly. At the upper end of this chute there is located within the housing 75 a sand box 94, firmly supported on timbers 95 forming part of the main gauntree frame. This box is or becomes filled with sand or



gravel to an extent sufficient to form a cushion to receive any blows due to the fall of large boulders dropped into it from the buckets, said cushion preventing wear of the metal parts of the box. A heavy steel bar 96 extends through the steel gauntree housing 75 at the upper front edge of the sand box, said bar being firmly supported on timbers 97, forming part of the main gauntree frame. This bar protects the adjacent wall of the sand box from injury by any heavy boulders which might strike at this point. This bar also serves another purpose, as it is strong enough to support the chain of buckets, so that, in case the said chain should break and the buckets should tumble over into the sand box, the bar will support them and prevent them from dropping into the water, thereby avoiding the difficult and tedious operation of recovering them again by fishing them out. On the inner side of each of the side members of the housing 75 there is located an angle bar 98, extending from the front edge of the housing diagonally downward to the top of the sand box. These angle bars are so arranged that one of their flanges extends inward from the face of the housing towards the corresponding part of the other angle bar, leaving, however, sufficient space between them to prevent their being struck by the large boulders. The buckets, in discharging their contents, frequently splash and splatter portions thereof against the sides of the housing, and the purpose of these angle bars is to form ledges to catch this material as it flows down the sides of the housing and conduct the same to the sand box, thereby preventing any waste of gold. The dump chute 93 is rounded or U-shaped in cross section, and is supported by means of a saddle casting 99, secured to the upright members 4 of the gauntree frame. It will be seen that the bottom of the sand box 94 is flat, while the casting 99 is curved to conform to the curvature of the dump chute, and since this latter has its lowest portion about on a level with the bottom of the sand box, the side portions of the saddle casting extend above the bottom of the sand box and serve to maintain a part of the sand and gravel in said box to form the cushion hereinbefore referred to.

The material discharged from the dump chute 93 is delivered into the primary separator, which may be of any suitable construction constituting a screen. I prefer to employ for this purpose a rotating hollow cylinder, open at both ends, having its axis of rotation inclined, so that it receives the material at one end, discharging the waste by gravity at the other end, the gold bearing sand passing through the body of the screen, which is perforated for that purpose. Such a screen is known as a grizzly, and is indicated as a whole by the reference numeral 100. It is supplied with water internally by

means of a perforated pipe 101, connected by a supply pipe 102 with a pump 103, driven by a motor 104. The grizzly is supported and rotated in any suitable manner.

The material which passes through the perforations of the grizzly is discharged into a distributing hopper or housing, indicated as a whole by the reference numeral 111 and supported from longitudinal timbers 112. This hopper incloses the lower portion of the revolving cylinder, and is constructed of a series of sections, stepped successively downward toward the discharge end of the cylinder in order to conform to its inclination. On each side of the upper part of the hopper, between the same and the grizzly cylinder 100, there are located perforated water pipes 113, connected with the main water supply pipe 102 and providing a supply of water directly into the interior of the hopper on each side thereof independently of the water supply furnished by the pipe 101 to the grizzly. Each hopper section consists of downwardly converging plates 114, having vertical upper ends 115 adjacent to the pipes 113, the inclined portions of said plates 114 being preferably at about right angles and being strengthened at their margins by angle irons 116. The plates 114 are supported at their lower converging ends by a support 117, which carries a narrow plate 118, which forms the bottom of the hopper. The lateral margins of the plate 118 extend outward beyond the plates 114, and are bent or inclined so as to be at right angles thereto, as shown at 119. The upper surfaces of the plates 114 are covered by wearing plates 120, removably connected thereto, and the bottom plate 118 has its upper surface covered by a similarly removable wearing plate 121. Each plate 114 is provided at its lower end with one or more discharge openings 122, two being shown in each plate in the present instance. Each discharge opening is controlled by a sliding gate 123 working in ways formed between the outer face of the plate 114 and guide plates 124 secured thereon, thus forming grooved ways in which the gates may slide. Each gate is provided with an operating stem 125, which passes through a keeper 126 on the outer face of the plate 114, said keeper being provided with apertures 127, while the stem is provided with a plurality of apertures 128. By means of a pin 129, passing through the apertures in the keepers 126 and through any desired one of the apertures 128 in the gate stem, each gate may be adjusted so as to be held either closed or open to any desired extent.

Each hopper section supplies a gold saving table to be hereinafter described, and the amount of material that it is desired to run upon any particular table is regulated by the raising and lowering of the gates of the corresponding hopper section. In practice, the



amount of sand and gravel, with the proper quantity of water to wash it properly, can be usually regulated by adjusting these gates. But if at any time it is found that too much solid matter is coming out of any particular gate, which is a thing more liable to happen at the upper end of the structure, the gate can be drawn out of its slot and a small plate or bar 130 may be slipped into the grooved ways from which the gate has been withdrawn and pushed down to the bottom of said ways, thereby forming a dam at the bottom of the opening 122. In this way a part of the solid matter is prevented from escaping through the opening under consideration and is forced to pass on to the next section, since the sand and gravel travel along the bottom of the trough, while water comes out of the openings 122 near the top thereof. Of course, the gates can be slipped into place again after the dams are inserted, so as to permit their continued utilization in regulating the flow.

On each side of the hopper there is located, below each hopper section, a distributing plate 131, so arranged as to receive the discharge from said section as it falls from the inclined flange 119 of the bottom plate of the hopper, which forms an apron to distribute the discharge from the openings 122. Above each distributing plate, at the top thereof, there is located a perforated water supply pipe 132, which discharges the water downward upon said plates so as to wash the same. The distributing plates and water pipes are supported by partitions 133 at the ends of the hopper sections, the distributing plates being removable to facilitate access to the gold saving tables below them. Below each distributing plate is located an inclined gold saving table 134, and adjoining the discharge end of the table 134, with its receiving end located at a lower level than the discharge end of the table 134, is a second gold saving table 135. This arrangement is in duplicate on each side of the apparatus, the tables being oppositely inclined or downwardly diverging, while the distributing plate, opposite in inclination to the corresponding tables, converge downwardly, the support 117 forming a partition between their discharge ends. It will be understood, of course, that the tables are provided with any approved form of riffles, and carry mercury used to collect the gold, or are otherwise adapted to carry out any approved gold saving process. The material which passes over the gold saving table falls off into sluices or troughs 136, by which it is carried off to the rear of the hull.

In the operation of this portion of the apparatus, the rocks, gravel, sand and earth lifted by the excavator are discharged through the dump chute into the interior of the grizzly at the upper end thereof, and are fed along the same by gravity, the grizzly

revolving and the material being thoroughly treated with a liberal spraying of water from the pipe 101 during its passage. This water supply thoroughly washes the gravel and rocks as they pass along the grizzly, so that the finer materials pass through the perforations in the body thereof, the larger material and rocks being discharged at the lower end of the grizzly. The finer material, which contains the gold, drops onto the inclined sides of the hopper, formed by the plates 114, or strictly speaking, onto the wearing plates 120 which cover the plates 114, when said wearing plates are employed. Here the material is met by another spraying of water from the pipes 113, and is carried down to the bottom of the trough or hopper, along which it flows, a certain portion of the mixed gravel, sand, gold and water escaping at each of the openings 122, whence it finds its way to the gold washing tables. It will be observed that the gold bearing material, as it leaves each hopper section through the openings 122, first runs over the apron formed by the flanges 119, which tends to spread the material laterally. From the apron 119 the material is delivered onto the inclined distributing plate 131, where it is again treated to a spraying of water, this time from the pipe 132, and is carried downward along said plate, being further spread out as it travels. The material then falls from the lower end of the distributing plate, forming a falls or eddy as it drops upon the table 134, thereby keeping the gravel, sand and water in suspension and allowing the gold to come into contact with the mercury at this point. The material, thus thoroughly distributed across the entire width of the table, travels by gravity down the same until, at the lower end of the table 134, it again falls and drops upon the table 135. It will be noted that as the material leaves the plate 131, its rate of flow is sufficient to carry it over so that it strikes the support 117, whereby it is forced to reverse the direction of its flow, so as to travel in the opposite direction, thus keeping the material thoroughly stirred up and giving the gold a better opportunity to settle to the bottom and come into contact with the mercury. This reversal of the flow of the current at this point is found by experience to be highly effective as a gold saving means. It has also been found by experience that the flow of material over miniature falls in its course is highly efficient in keeping the sand and gravel suspended and effecting a separation of the gold, and it will be seen that ample provision of this nature is made in the apparatus just described. It occasionally happens that in the course of operation it becomes necessary to handle "over-burden" or clay material which contains no gold, and since experience has shown that certain



forms of clay tend to rob the gold tables of their gold, it is not desirable that this material should pass over the tables. In such a case, the gates 123 of all the hopper sections are closed, with the exception of the lowermost ones, and the tables which receive the flow from these latter are covered over with a trough which conducts the material directly from the gates to the sluice boxes 136, thus keeping the material entirely out of contact with the gold saving tables.

The gravel and sand carried along by the water as it falls from the ends of the tables flow along the boxes 136 and are discharged at the rear of the hull. In certain cases, where the amount of sand is such that it cannot all be discharged as waste at the end of the sluice boxes 136, a sand pump is employed for the purpose of disposing of the excess of sand, such a pump being indicated at 137, driven by a motor 137<sup>a</sup>. This pump draws its supply of sand from a sump 138 and discharges it at any desired point. The sump is supplied by troughs or sluice boxes 139, each of which has its receiving end located below a slot 140 in the corresponding sluice box 136, through which slot a portion of the sand and water falls into the trough 139. The sump is shown in detail in Figs. 11 and 12, and receives the suction pipe of the sand pump 137. In practice, it is found that this pump sometimes loses its priming or becomes clogged, whereupon it has heretofore been necessary to either lift the suction pipe out of the sump, or shovel the material out of the sump by hand. I avoid these difficulties by providing in the sump, preferably in the bottom thereof, an inlet opening 141, controlled by a valve 142, which is pivoted to the under side of the bottom of the sump and actuated by a handle rod 143. In case the sand pump loses its priming or becomes clogged, the sand valve 142 can be dropped, allowing the accumulation of sand around the suction pipe to escape, and also permitting a supply of water to come in through the valve opening and enable the pump to get properly started again, whereupon the valve is again closed. The valve may be held closed in any suitable way, as, for instance, by the construction shown, in which the valve stem or handle rod 143 is provided with notches 143<sup>a</sup>, adapted to engage a fixed plate 143<sup>b</sup> and thus hold the valve either closed or open, as desired.

The heavy material which passes out at the open lower end of the grizzly is received by a stacker or conveyer, which carries it away and delivers it at a distance from the dredge, a chute 144 and hopper 145 being interposed between the grizzly and stacker, as indicated in Fig. 1. This stacker may be of any suitable construction, but I prefer that

shown, described and claimed in the above mentioned application.

In addition to the structural features hereinbefore referred to, the apparatus comprises, of course, the necessary structural features and mechanisms required in a dredge of this character. I have shown, at 183, a winch whereby the headline, the four fleeting lines arranged in pairs at the front and rear of the hull at the sides thereof, and the spud lines, are controlled and operated, being driven by a motor 184. Preferably, the various motors are electric motors, although it is obvious that any suitable source of power may be employed.

The general operation of the dredge is well known and requires no description, while the operation of the specific novel features hereinbefore referred to has been fully described in connection with the detailed description of their construction.

I do not wish to be understood as limiting myself to the precise details of construction hereinbefore described and shown in the accompanying drawings, as it is obvious that these details may be modified without departing from the principle of my invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a dredge of the character described, the combination, with an endless bucket chain a grizzly and a gauntree frame, of a pocket or housing carried by said gauntree frame into which said chain discharges, said pocket or housing having a discharge chute, and a sand box or receptacle located in front of said chute and adapted to receive and retain a cushion of sand or the like, substantially as described.

2. In a dredge of the character described, the combination, with an elevator, a grizzly and a gauntree frame having an inclosed housing provided with a sand box or receptacle to receive and retain a cushion of sand or the like, of a protective metal bar firmly mounted in the gauntree frame and extending across the upper edge of the sand box, substantially as described.

3. In a dredge of the character described, the combination with an endless bucket chain, a grizzly and a housing or pocket receiving the discharge of said bucket chain and provided with a sand box, of ledges secured to the inner side walls of the housing and extending diagonally downward to the sand box to receive and conduct the splashings thereto, substantially as described.

4. In a dredge of the character described, the combination, with an elevator, a grizzly and a housing having a sand box provided with a flat bottom and a discharge opening therefor, of a saddle casting mounted on said housing at said discharge opening and curved



so as to close the lateral portions thereof above the bottom of the sand box, and a correspondingly curved discharge chute secured to said casting, substantially as described.

5 5. In a dredge of the character described, the combination, with a rotary cylindrical screen or grizzly, of a distributing hopper inclosing the lower portion of the grizzly and comprising a plurality of sections, each section having side walls comprising substantially vertical upper portions and lower portions converging downward at substantially right angles to each other and terminating a short distance apart below the grizzly, a bottom extending between the lower ends of said side walls, said side walls being provided with gate-controlled discharge openings, a wash pipe located within the grizzly, and a separate wash pipe located at the top of the hopper outside of the grizzly and arranged to wash the inclined sides of the hopper.

6. In a dredge of the character described, the combination, with a rotating cylindrical screen or grizzly, of a distributing hopper inclosing the lower portion of said grizzly and comprising a plurality of sections, each section extending below the preceding section and having side walls converging downward at substantially right angles to each other and terminating a short distance apart below the grizzly, a bottom of less width than the diameter of said screen connecting the lower ends of said side walls, said side walls being provided with gate-controlled discharge openings, said bottom having its lateral margins extended beyond the sides of the hopper to form discharge aprons and arranged at substantially right angles to said converging side walls.

7. In a dredge of the character described, the combination, with a primary separator or screen, of a distributing hopper having discharge openings at the lower margins of its sides, gates controlling said openings, and removable dams adapted to be inserted in said openings and extending between the sides thereof, whereby the lower margins of said openings may be raised above the bottom of the hopper.

8. In a dredge of the character described, the combination, with a primary separator or screen, of a distributing hopper having discharge openings at the lower margins of its sides, guideways located at the sides of said openings, controlling gates adjustable in said guideways and removable therefrom, and dam plates adapted to be inserted in said guideways, substantially as described.

9. In a dredge of the character described, the combination, with a primary separating screen, of a distributing hopper having gate-controlled discharge openings in its sides at the bottom thereof, oppositely inclined gold saving tables located below said hopper, and downwardly converging distributing plates

arranged between the hopper and tables and inclined in a direction opposite to the inclination of the corresponding tables.

10. In a dredge of the character described, the combination, with a primary separator or screen, of a distributing hopper having gate-controlled discharge openings in the lower portions of its sides, oppositely inclined gold saving tables located below said hopper, convergingly inclined distributing plates arranged between said hopper and tables and inclined oppositely to the corresponding tables, and a partition located between the discharge ends of the distributing plates.

11. In a dredge of the character described, the combination, with a primary separator or screen, of a distributing hopper having gate-controlled discharge openings in the lower portions of its sides, oppositely inclined gold saving tables located below said hopper, distributing plates arranged between said hopper and tables and inclined oppositely to the corresponding tables, and a partition located between the discharge ends of the distributing plates, said partition constituting a support between the tables and hopper, substantially as described.

12. In a dredge of the character described, the combination, with a primary separator or screen, of a distributing hopper having gate-controlled discharge openings in the lower portions of its sides, oppositely inclined gold saving tables located below said hopper, convergingly inclined distributing plates arranged between said hopper and tables and inclined oppositely to the corresponding tables, and water supply pipes located above said distributing plates and arranged to provide an independent water supply thereto.

13. In a dredge of the character described, the combination, with a primary separator or screen, of a hopper having downwardly converging side walls provided with gate-controlled discharge openings in their lower portions, a bottom for said hopper having its sides extended to form downwardly diverging aprons extending beyond said discharge openings, downwardly converging distributing plates located below said discharge openings to receive the discharge from said aprons, downwardly diverging gold saving tables located below said distributing plates, a partition between the discharge ends of the distributing plates, a wash pipe supplying the screen, separate wash pipes supplying the hopper at the upper part of the sides thereof, and other separate wash pipes supplying the distributing plates, substantially as described.

14. In a dredge of the character described, the combination, with a distributing hopper having discharge openings in its sides, and oppositely inclined gold saving tables located below the same, of removable converging



inclined distributing plates interposed between said hopper and tables, substantially as described.

15. In a dredge of the character described, the combination, with gold saving devices and their discharge sluices, of a submerged sump located in the rear of said dredge and adapted to receive the material from said sluices, and a discharge pump having its suc-

tion pipe located in said sump, said sump 10 being provided with a valve-controlled opening in its lower portion.

In testimony whereof, I affix my signature in presence of two witnesses.

GEORGE W. KING.

Witnesses:

ROBERT G. LUCAS,  
WILLIAM R. SHISLER.