

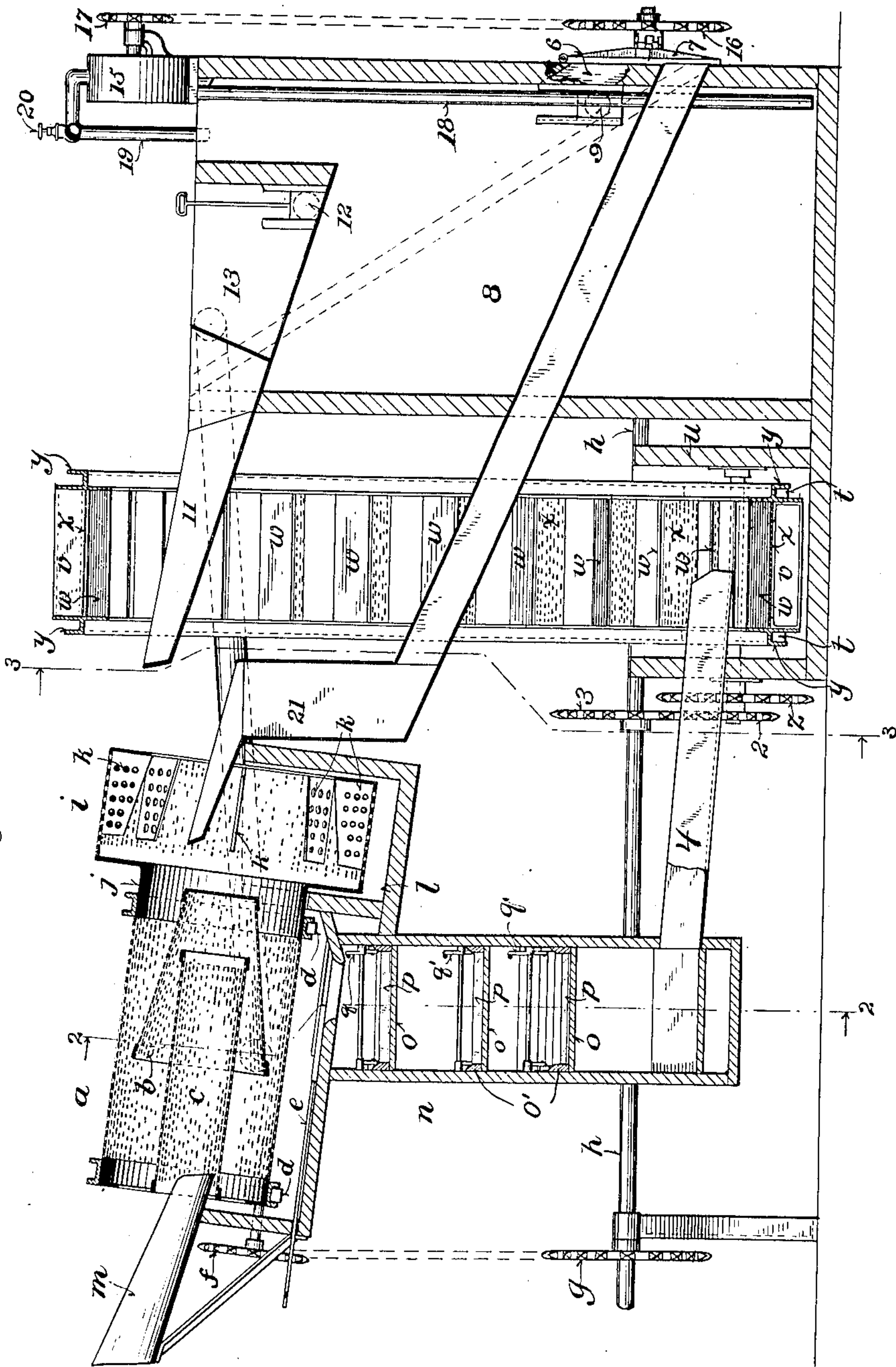
No. 887,490.

PATENTED MAY 12, 1908.

H. H. MEYER.
ORE WASHING MACHINE.
APPLICATION FILED FEB. 25, 1907.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Wm. Palm.

Chas. L. Goos.

Inventor:

Hugo H. Meyer

By Wickler, Hordens, Bolthum & Fawcett

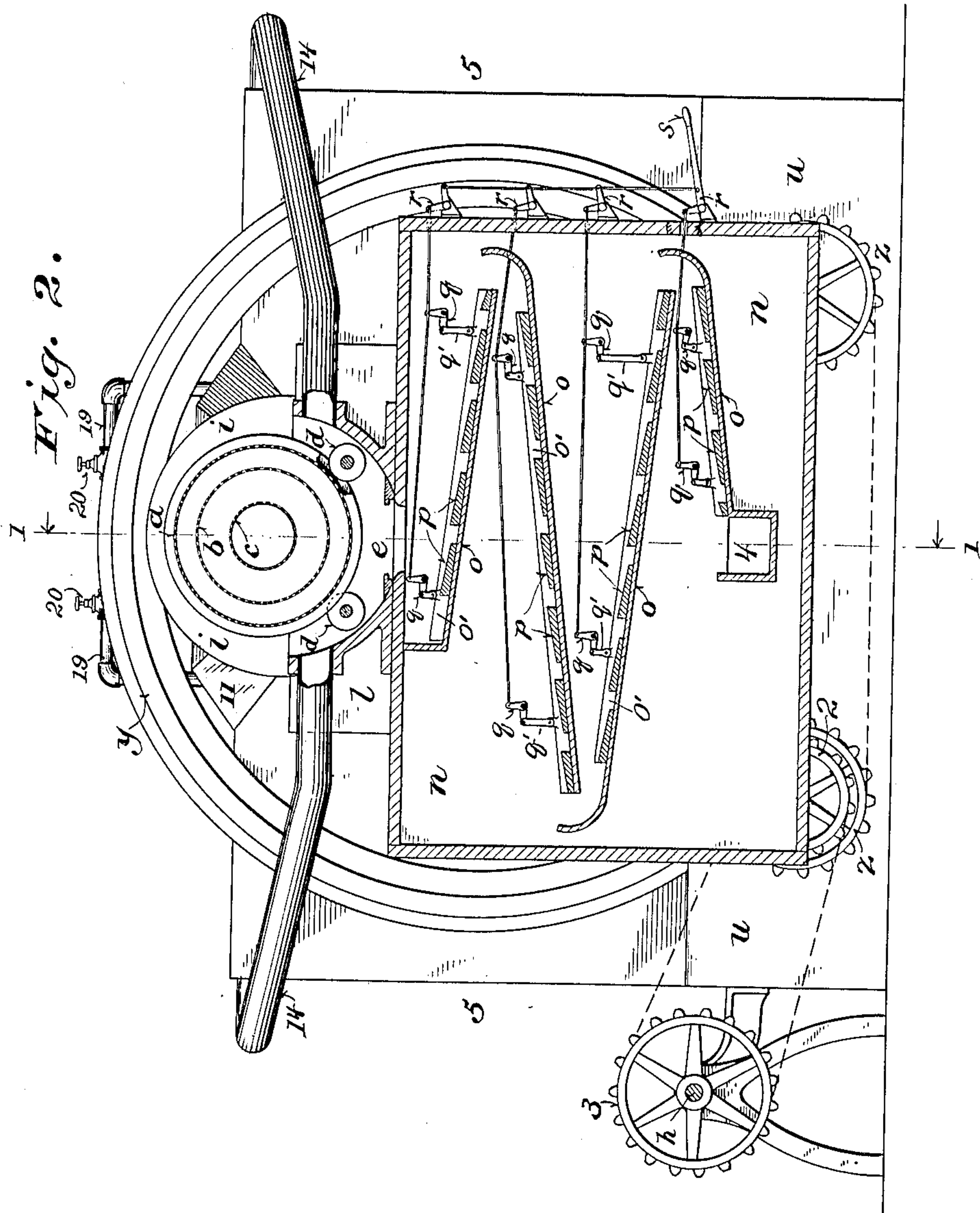
Attorneys.

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4 SHEETS—SHEET 2.



Witnesses:
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Chas. L. Goss.

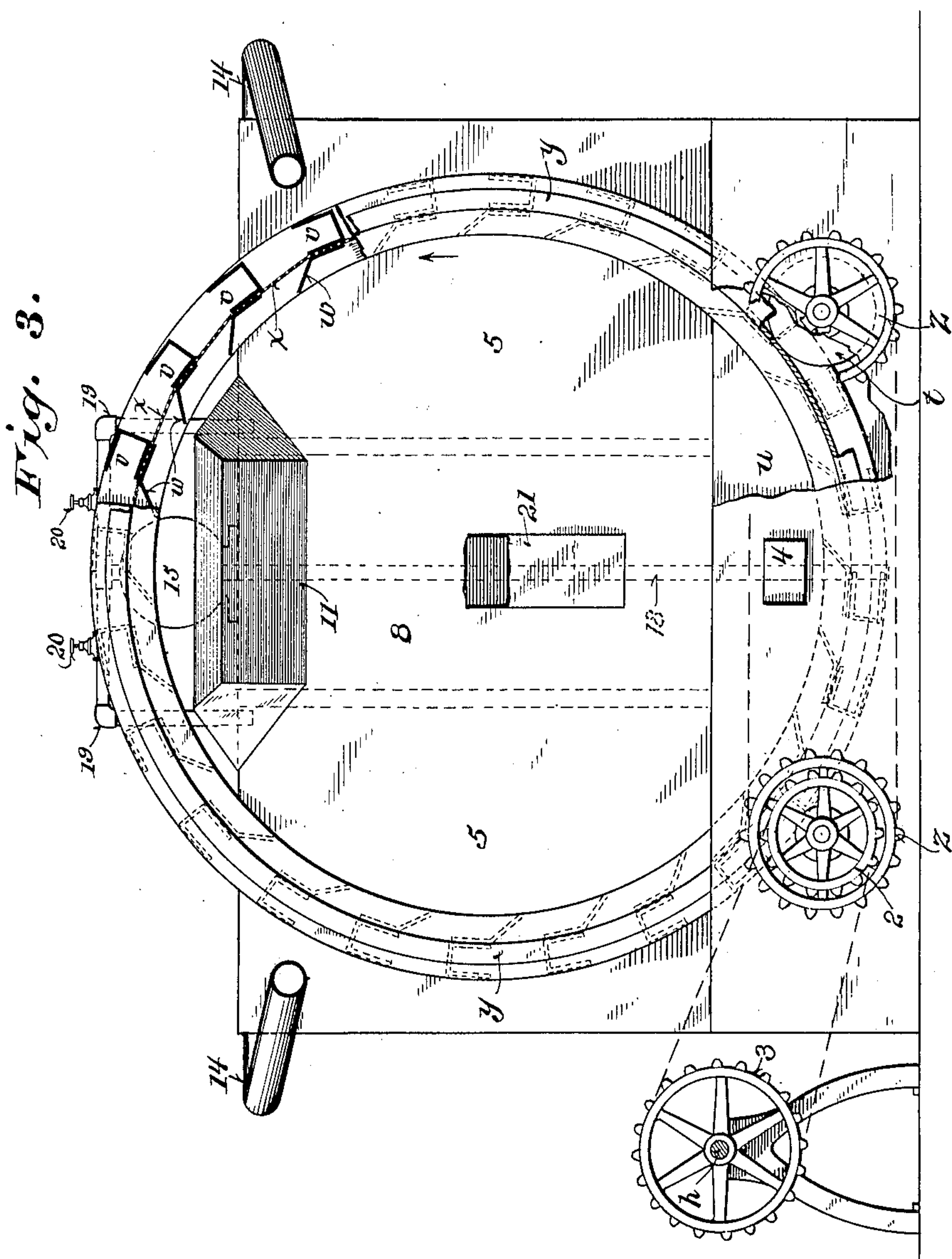
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4 SHEETS—SHEET 3.



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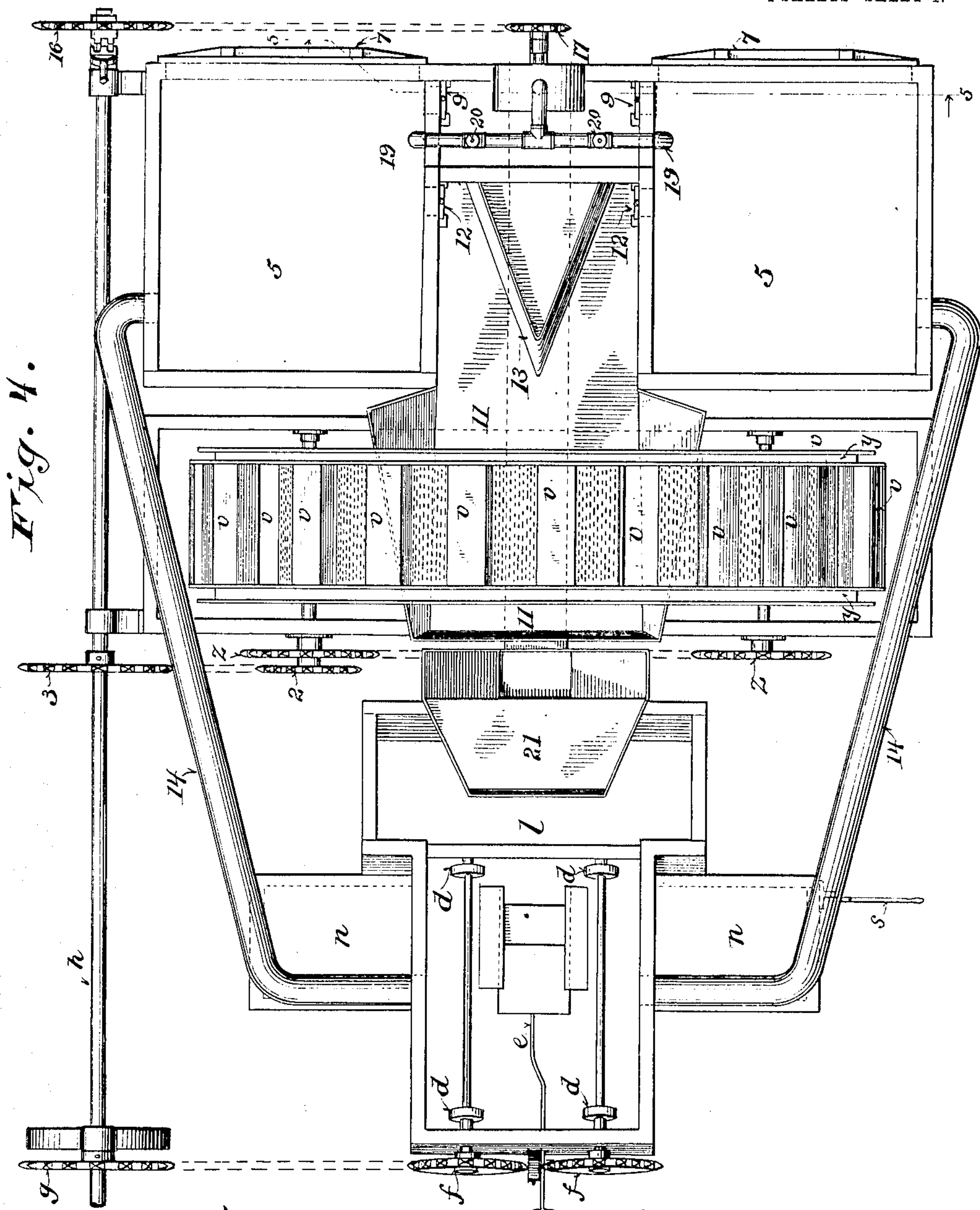
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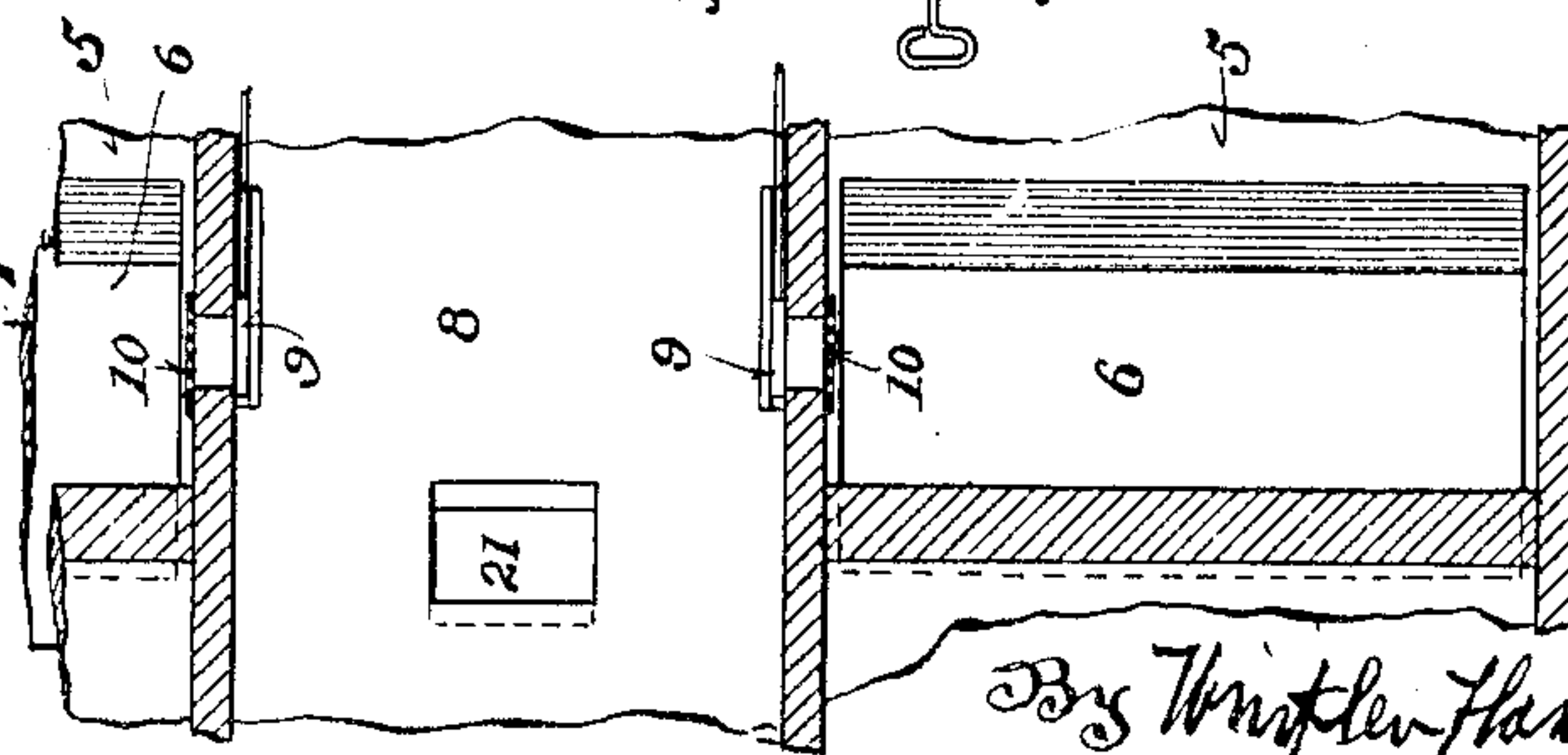
H. H. MEYER.
ORE WASHING MACHINE.
APPLICATION FILED FEB. 25, 1907.

4 SHEETS—SHEET 4.



Witnesses:
Fred Palm
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Fig. 5.



Inventor:
H. H. Meyer

By Wm. H. Hendon, Attorney.

UNITED STATES PATENT OFFICE.

HUGO H. MEYER, OF RACINE, WISCONSIN.

ORE-WASHING MACHINE.

No. 887,490.

Specification of Letters Patent.

Patented May 12, 1908.

Application filed February 25, 1907. Serial No. 359,229.

To all whom it may concern:

Be it known that I, HUGO H. MEYER, a citizen of the United States, residing at Racine, in the county of Racine and State of Wisconsin, have invented certain new and useful Improvements in Ore-Washing Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The main objects of this invention are to effectively and economically separate metals or concentrates, more particularly the precious metals, from the sand, gravel or refuse with which they are found, especially by what is known as placer mining in localities where water is scarce; to economize water by using it over and over again, in the separation of the metal or concentrates from the sand, gravel or refuse; to save time and labor; and generally to improve the construction and operation of machines of this class.

It consists in certain novel features of construction and in the peculiar arrangement and combinations of parts as hereinafter particularly described and pointed out in the claims.

In the accompanying drawing like characters designate the same parts in the several figures.

Figure 1 is a vertical longitudinal section on the line 1 1, Fig. 2, of a machine embodying the invention; Fig. 2 is a cross section on the line 2 2, Fig. 1; Fig. 3 is a similar section on the line 3 3, Fig. 1; Fig. 4 is a plan view of the machine, the rotary screen being removed; and Fig. 5 is a sectional detail on the line 5 5, Fig. 4.

A rotary screen preferably comprising coaxial members *a*, *b* and *c*, is mounted in an inclined position on rollers *d* in a trough *e*, the outer member of the screen being provided with channeled or flanged guide rings with which said rollers engage. The rollers *d* are mounted on inclined shafts which extend through the end of the trough and are provided with sprocket wheels *f*, these sprocket wheels being connected by a chain belt with a sprocket wheel *g* on a driving shaft *h*. The outer and inner members *a* and *c* of the screen are of cylindrical form and open at their lower ends, the outer member being closed or partially closed at its upper end and the inner member open at its upper end. The intermediate member *b* is of conical or frustum shape, closed at its lower smaller end and open at its upper larger end between the ends of the

outer member *a*, the inner member *c* extending at its lower end into the member *b*. The screen is set with its axis at such an inclination and the intermediate conical or frustum shaped member is so formed that its lower side will be inclined in a reverse direction from that of the lower sides of the outer and inner cylindrical members with relation to a horizontal line. At the lower end of the screen the outer member *a* has a perforated extension *i* of larger diameter and connected therewith by an imperforate section *j*. The extension *i* is provided with internal buckets or perforated transverse wings *k*, and is inclosed on the lower side in a trough *l* or in an extension or compartment of the trough *e*, from which it is partially separated adjacent to the imperforate section *j* by a partition, as shown in Fig. 1. A feed spout *m* projects into the upper end of the inner member *c* of the screen.

The trough *e* has an opening in the bottom near its lower end into the upper part of a riffle box or conduit *n*. This box or conduit is provided with a series of reversely inclined plates *o*, arranged one above another so that the material discharged from the lower end of each upper plate will be caught on the upper end of the next plate below. Upon each plate *o* rests a vertically movable series of riffles *p* connected at the ends by cleats or strips *o'* extending along the sides of the box or conduit *n*. Each series of riffles is suspended from horizontally disposed arms *q*, which are mounted on rocker shafts passing transversely across the riffle box or conduit, as shown in Figs. 1 and 2. Vertically disposed arms *q'* formed with the arms *q* or fixed on said rocker shafts at one side of the riffle box or conduit are connected by rods passing through one end of said box or conduit. The several series of riffles may be separately raised from the plates *o* and lowered into working position thereon by any suitable means, such as levers attached to the outer ends of the connecting rods, or the several connecting rods may be connected with each other for simultaneous operation through bell crank levers *r*, one of which is provided with a handle arm *s*, as shown in Fig. 2.

An open elevator wheel mounted on rollers *t* in a trough *u*, as shown in Fig. 3, is provided around its rim with a series of buckets *v*, and inside of said buckets with a series of internal buckets or wings *w*, which are sep-

arated from the buckets *v* by an intervening screen or screens *x*, arranged substantially concentric with the wheel. On each side of its rim the elevator wheel is formed or provided with channeled or flanged circular ways *y*, which hold it in place on the rollers *t*. The rollers *t* are mounted on horizontal shafts extending transversely through the trough *u* and each projecting therefrom at one end which is provided with a sprocket wheel *z*. One of these shafts is provided with another sprocket wheel 2, which is connected by a link belt with a sprocket wheel 3 on the driving or main shaft *h*. The two sprocket wheels *z* are connected with each other by a link belt. The elevator wheel is made of such diameter that it will extend on the under side below the discharge from the riffle box or conduit and on the upper side above the trough *e*. A conduit 4 leads from the lower part of the riffle box or conduit *n* into the elevator wheel above the internal buckets or wings *w* on the under side of the wheel, as shown in Fig. 1.

Two settling tanks 5 located adjacent to the elevator wheel and extending at the top to or preferably somewhat above the level of the top of the trough *e*, have inclined bottoms directed downwardly as indicated by dotted lines in Fig. 1, towards lateral discharge openings 6, which are normally closed by gates or valves 7. Between these tanks is a reservoir 8, which communicates with each tank through an opening controlled by a valve 9. These openings are provided as shown in Fig. 5, with screens or strainers 10, to prevent the passage of coarse or waste material from the tanks into said reservoir when the valves 9 are opened.

A chute 11 extending through or into the elevator wheel below the buckets on the upper side thereof, leads therefrom to the tanks 5, with which it communicates through openings controlled by valves or gates 12. This chute is preferably formed or provided at its lower end with a V-shaped deflector 13, to direct the material flowing through the chute towards the openings into the tanks 5. The upper part of each tank is connected by a return pipe or conduit 14 with the trough *e*, said pipe or conduit being inclined downwardly from the tank to the trough so that water will overflow from the upper part of the tank into said trough by gravity.

A pump 15, which may be conveniently driven from the shaft *h* by a link belt connecting a sprocket wheel 16 on said shaft with a sprocket wheel 17 on the pump shaft, is arranged to elevate water from the reservoir 8 into the tanks 5. The suction pipe 18 of the pump extends into the lower part of the reservoir 8, while its discharge pipe has branches 19 leading into the upper part of the tanks 5 and provided with valves 20 for shutting off the flow of water into either tank.

A chute or conduit 21 leads from the interior of the perforated extension *i* of the rotary screen above the tank or compartment *l* downwardly through the elevator wheel and through the reservoir 8 to a point between and in line with the discharge openings 6 from the tanks 5, so that the refuse sand, gravel and rock discharged from the screen as well as that discharged from the settling tanks, may be deposited into the same receptacle or upon a conveyer for carrying or conducting it away from the machine. The sprocket wheel 16 is connected with the main or driving shaft *h* by a clutch, as shown in Fig. 4, so that the pump may be stopped and started at will, without otherwise affecting the operation of the machine.

The machine herein shown and described operates as follows: The trough *e* being filled or supplied with water and the machine being set in motion, ore is fed through the spout *m* into the inner member *c* of the rotary screen. From the lower end of the inner member *c* it is discharged into the intermediate conical member *b*, in which it travels in the opposite direction, and from the larger open end of which it is discharged into the outer member *a*. From the outer member of the screen the sand, gravel and rock or waste material too coarse to pass through the meshes of the screen, is discharged into the perforated extension *i*, in which it is taken up and drained by the buckets or wings *k* and discharged into the chute or conduit 21. In its passage back and forth through the several members of the rotary screen, the ore is broken up and disintegrated, and the finer and heavier parts, including the metal or concentrates, pass through the outer member of the screen into the trough *e*, from which they are discharged with the water supplied to said trough into the riffle box or conduit *n*. As the material flows over the riffles *p*, which rest on the plates *o*, the heavier particles of metal or concentrates settle and are caught in the pockets between the riffles, while the coarser lighter waste portions pass onward with the water and are finally discharged from the lower plate *o* into the conduit 4. From the conduit 4 the material is delivered into the lower part of the elevator wheel upon the screen or screens *x*, the solid portion being carried up by the buckets or wings *w* on the inner side of the screen, while the water or liquid portion passing through the screen into the trough *u* is taken up by the buckets *v* on the outer side of said screen. As the buckets pass on the upper side of the wheel over the upper end of the chute 11, the water is discharged from the outer buckets *v* through the screen and across the inner buckets or wings *w*, taking the solid material therefrom with it into said chute. From the chute 11 the solid material with the water flows into

one of the tanks 5, the valves 7 and 9 at its lower end and the valve 12 from the chute into the other tank being closed. The water rising to or near the top of the tank into which the material is discharged, flows back therefrom through the return conduit 14 into the trough *e*, and passes again through the machine, being used over and over again for washing and concentrating fresh ore. When the tank into which the material flows is filled with solid matter to or nearly to the level of the opening from the chute 11, the valve 12 controlling said opening is closed, the valve controlling the corresponding opening into the other tank having been previously opened, and the valves 7 and 9 of that tank closed. The valve 9 of the first tank is then opened, allowing the water to drain therefrom into the reservoir 8. The valve 9 of the first tank is now closed and the valve 7 thereof is opened, permitting the solid waste material to escape from the tank into a conveyer or receptacle for carrying it away. The second tank 5 being filled before the water is drained from the first tank, the operation of the machine continues without interruption in the manner above explained. Whenever the reservoir 8 is filled, or it is desired, the pump 15 is started and the water is drained therefrom and discharged into whichever of the tanks 5 is in condition to receive it, the valve 20 in the branch of the discharge pipe leading into the other tank being closed.

When the machine has once been supplied with a sufficient volume of water for its operation, this water being used over and over again in the manner specified, a small additional amount is sufficient to make up for that which evaporates and that which passes off with the waste material.

Whenever it is desired to remove the metal or concentrates from the pockets between the riffles *p*, the feed of ore or gravel to the machine is temporarily stopped while water continues to flow from one of the return conduits 14 through the trough *e* into the riffle box or conduit *n*, the riffles are then lifted from the plates *o* and the metal or concentrates are washed therefrom into the conduit 4 and caught in any suitable receptacle placed under the lower end of said conduit.

With the gold in placer gravel, considerable quantities of oxid of iron or magnetite, known as "black sand" are usually found. This material being much heavier than the sand, gravel or waste soon fills the pockets in the riffle box or conduit and would cause the metal or ore to overflow the riffles and pass off with the waste unless the pockets were frequently emptied. Being in itself a valuable product, the magnetite or black sand is thus saved with the gold or other valuable material, and this is greatly facilitated by the provision above mentioned for lifting the riffles from the riffle plates.

Various changes in the minor details of construction and arrangement of parts may be made without materially affecting the operation of the machine and without departure from the principle and scope of the invention.

I claim:

1. In an ore washing machine the combination of a riffle box containing a series of reversely inclined riffle plates arranged one above another, a trough having a discharge opening at the bottom over the upper riffle plate, a rotary screen mounted in said trough, an elevator wheel having a series of buckets around its rim, a trough containing the lower part of the elevator wheel, a conduit leading from the lower part of the riffle box into the lower part of said wheel, a settling tank, a chute extending from the upper interior part of said wheel to said tank, and a return conduit leading from the upper part of said tank into the screen trough, substantially as described.

2. In an ore washing machine, a riffle conduit, a trough having a discharge opening into the upper part of said conduit, an inclined rotary screen mounted in said trough and having a perforated extension of larger diameter at its lower end with internal buckets or wings, a discharge chute leading from the interior of said perforated extension, an elevator wheel provided with buckets, a discharge conduit leading from the lower part of the riffle conduit into the lower part of said wheel above the buckets on the lower side thereof, a settling tank, a chute leading from the interior of said wheel below the buckets on the upper side thereof to said tank, and a return conduit leading from the upper part of said tank back into the screen trough, substantially as described.

3. In an ore washing machine, a riffle conduit, a trough having a discharge opening into the upper part of the riffle conduit, an inclined rotary screen mounted in said trough and comprising coaxial members, the intermediate member being of conical shape and open at its upper larger end, and a perforated extension of larger diameter at the lower end of the outer member, said trough being partially divided into two compartments by a partition between the outer member of the screen and its perforated extension, an elevator wheel having a series of buckets around its rim into which the riffle conduit discharges on the lower side of the wheel, a settling tank into which said buckets are arranged to discharge on the upper side of said wheel, and a return conduit leading from the upper part of said tank back into the screen trough, substantially as described.

4. In an ore washing machine the combination of a riffle conduit, a trough having a discharge opening into the upper part of said conduit, a screen mounted in said trough, an

elevator wheel provided around its rim with a series of buckets and inside of the buckets with a series of wings or buckets separated by a screen from the outer buckets, a discharge
 5 spout or conduit leading from the lower part of the riffle conduit into said wheel above the buckets on the lower side thereof, a settling tank, a chute leading from the interior of said wheel below the buckets on the upper
 10 side thereof to said tank, and a return conduit leading from the upper part of said tank back to the screen trough, substantially as described.

5. In an ore washing machine the combination of a riffle conduit, a trough having a discharge opening into the upper part of said
 15 conduit, a screen mounted in said trough, an elevator wheel having a series of buckets around its rim into which the riffle conduit discharges above the buckets on the lower
 20 side of the wheel, two settling tanks, a chute leading from the interior of said wheel below the buckets on the upper side thereof to said tanks, valves controlling communication between said chute and tanks, and return con-
 25 duits leading from the upper part of said tank back to the screen trough, substantially as described.

6. In an ore washing machine the combination of a riffle conduit, a trough having a discharge opening into the upper part of said
 30 conduit, a screen mounted in said trough, an elevator wheel provided with buckets arranged to receive material discharged from the riffle conduit, settling tanks having valve controlled waste openings at the bottom, a
 35 reservoir having valve controlled connections with the lower part of said tanks, a chute arranged to catch material discharged from the buckets on the upper side of the elevator wheel and convey it into either of said
 40 tanks, return conduits leading from the upper part of said tanks into the screen trough, and means for elevating water from said reservoir into either of said tanks, substantially as described.
 45

7. In an ore washing machine the combination of a riffle conduit, a trough having a discharge opening into the upper part of said

conduit, an inclined rotary screen mounted
 5 in said trough and having a perforated extension of larger diameter with internal buckets or wings at its lower end, a discharge conduit leading out from the interior of said extension below the buckets on the upper side
 55 thereof, an elevator wheel provided with buckets around its rim arranged to receive material discharged from the riffle conduit, a settling tank into which material is discharged from the upper part of said wheel, a
 60 return conduit leading from the upper part of said tank into the screen trough, a reservoir communicating with the lower part of said tank through a valve controlled opening or connection, and means for elevating water
 65 from said reservoir back into said tank, substantially as described.

8. In an ore washing machine the combination of a riffle conduit, a trough having a discharge opening into the upper part of said
 70 conduit, an inclined rotary screen mounted in said trough and having at its lower end a perforated extension of larger diameter with internal wings or buckets, an elevator wheel provided around its rim with buckets arranged to receive on the lower side of the
 75 wheel material discharged from the riffle conduit, two tanks having valve controlled discharge openings at the bottom, means for conveying material discharged from the upper part of said wheel into either of said
 80 tanks, return conduits leading from the upper part of the tanks back into the screen trough, a reservoir having a valve controlled connection with the lower part of each tank, means for elevating water from said reservoir
 85 into either tank, and a discharge conduit leading from the interior of the perforated extension of the screen to a point adjacent to the discharge openings of said tanks, substantially as described.
 90

In witness whereof I hereto affix my signature in presence of two witnesses.

HUGO H. MEYER.

Witnesses:

CHAS. L. GOSS,
 ALICE E. GOSS.