

F. E. WOODBURY.
JIGGER.

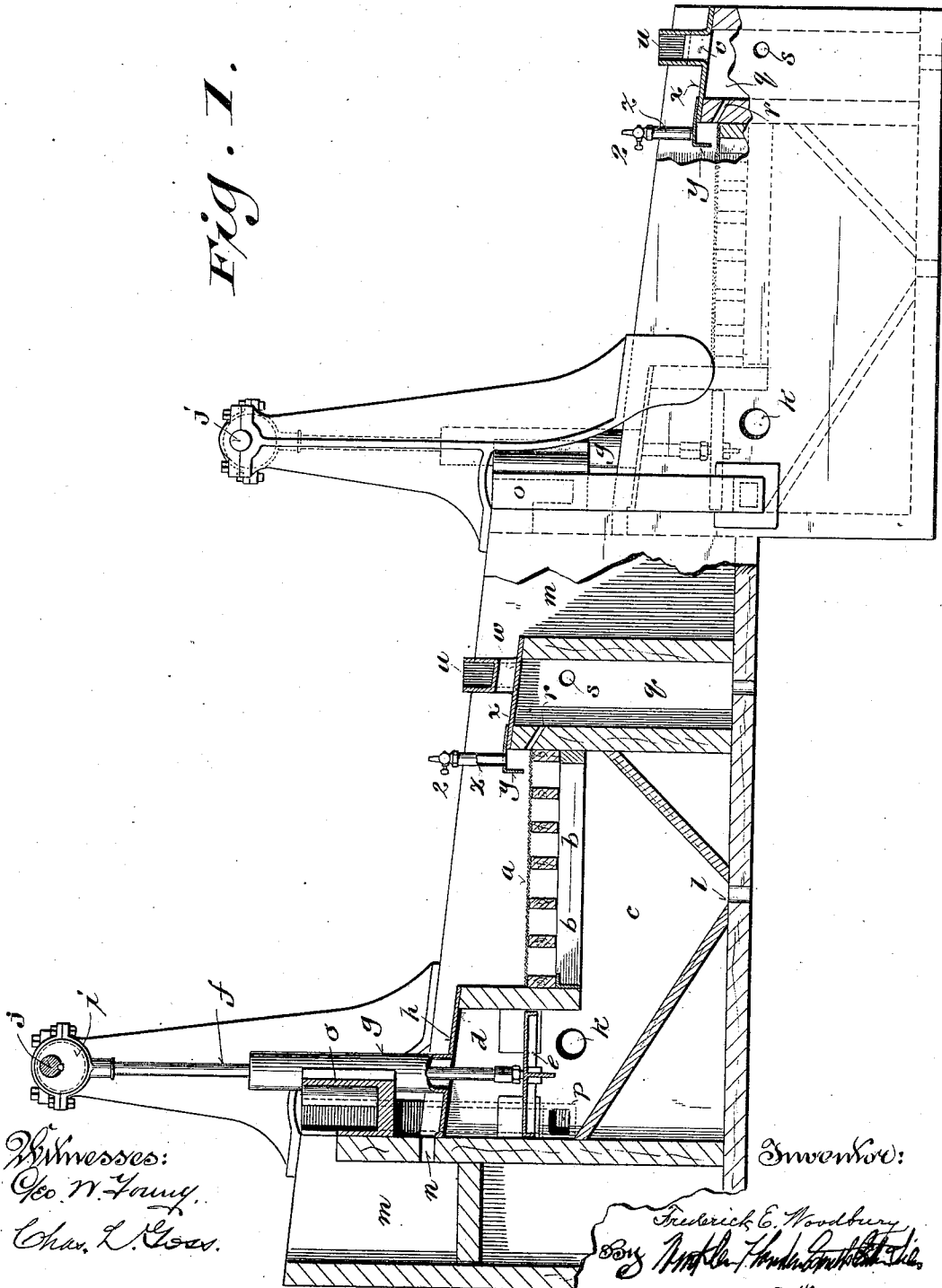
APPLICATION FILED APR. 9, 1902.

1,046,702.

Patented Dec. 10, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



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Inventor:

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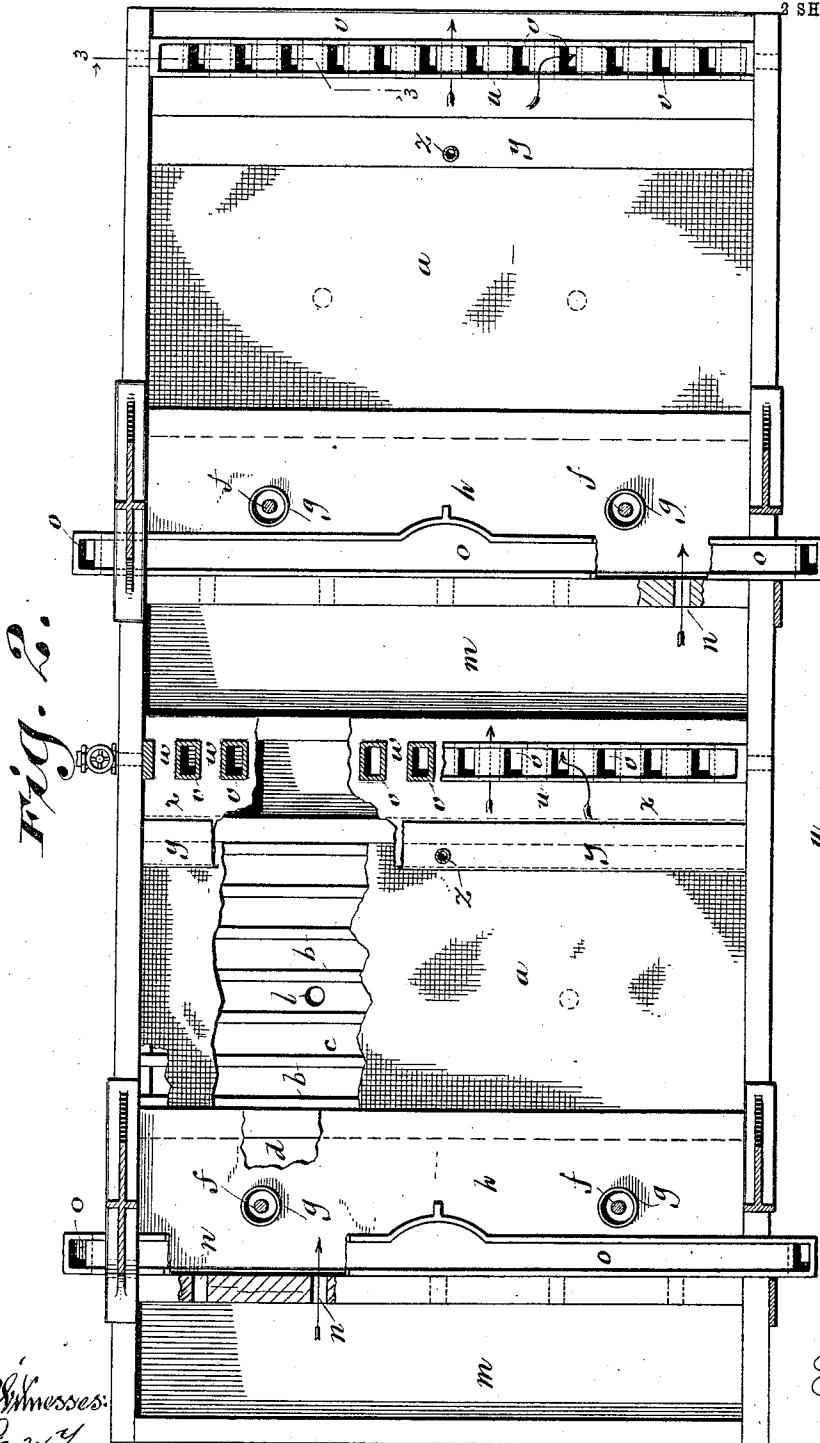
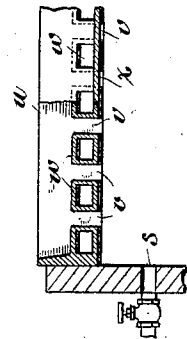


Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

FREDERICK E. WOODBURY, OF MILWAUKEE, WISCONSIN.

JIGGER.

Specification of Letters Patent.

Patented Dec. 10, 1912.

1,046,702.

Application filed April 9, 1902. Serial No. 101,998.

To all whom it may concern:

Be it known that I, FREDERICK E. WOODBURY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Jiggers, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

10 This invention relates to that class of concentrators known as jiggers, for treating ores or crushed metal bearing rock. Its main objects are to increase the capacity of jiggling machines of any given size; to reduce the amount of water required to operate them; to effect a greater saving of metal or metalliferous mineral; and generally to improve the construction and operation of machines of this class.

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

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

30 Figure 1 is a view partly in vertical longitudinal section and partly in side elevation of a double jiggling machine embodying the invention; Fig. 2 is a plan view of the same, certain parts being broken away and shown in horizontal section; and Fig. 3 is a vertical section of a part of the hydraulic gravel regulator on the line 3 3, Fig. 2.

35 For the purpose of illustration, a double machine, consisting essentially of two jiggers arranged end to end so that the tailings from one jigger will be delivered into the feed box or receptacle at the head of the other jigger, is shown. As the two jiggers are substantially alike, it will be sufficient to describe one of them in detail.

45 *a* is a sieve which is of considerably greater width than length,—that is, its length in the direction of the flow of ore over it is determined by the extent of the pulsations of water produced by the plunger in the same general direction; and is limited to the effective range of such pulsations which is determined by the length and movement of the plunger and by the shape of the hutch, while the width of the sieve may be extended indefinitely, the

width of the plunger being correspondingly extended, thereby proportionally increasing 55 the capacity of the jigger. The sieve consists of wire cloth of suitable mesh attached to cross slats *b*, and supported by cleats over a hutch *c*. At one end the hutch communicates with a plunger compartment *d*, which 60 extends above the sieve. A plunger *e*, fitted to work in this compartment, is provided with rods *f* extending upwardly through vent tubes *g*, attached to the top plate *h*, over which the pulp is fed to the sieve. A 65 reciprocating movement is imparted to the plunger by any suitable means. For this purpose the rods *f* are attached at their upper ends to the straps of eccentrics *i*, on a shaft *j*, supported above the plunger compartment by standards rising from the sides 70 of the machine. Water is supplied to the hutch below the plunger through one or more openings or connections *k*. The hutch is provided at the bottom with one or more 75 discharge openings *l*. *m* is a feed box or receptacle which receives the pulp from the crusher or the tailings from another jigger. It is provided just above the top plate *h* of the plunger compartment with an opening 80 or series of openings *n*, for delivering the heavier material to the sieve *a*, and above said opening or openings with an overflow consisting of a box or trough *o*, which is connected at the ends by descending con- 85 duits with the hutch *c*, through openings *p* below the plunger. This overflow trough with its connections leading into the hutch, is called a water lessener.

90 *q* is a closed box or receptacle into which relatively coarse and rich material called ragging or middlings, is discharged from the sieve *a* through an opening *r* in the tail plate. It is supplied with water through one or more openings or connections *s*, and 95 the ragging or middlings is drawn therefrom continuously or intermittently through one or more openings *t*.

100 *v* is an open water gage and air vent for holding water above the gravel or discharge box or receptacle *q* and permitting air to escape therefrom. It communicates with the upper part of said receptacle through vertical openings or passages *v*, which alternate with horizontal openings or passages *w*. 105 This gage and vent may be conveniently

cast with the top or cover plate x of the box or receptacle q , over which the tailings are discharged.

y is a shield which may be conveniently made of sheet metal attached to the tail plate and extending therefrom over the discharge opening r and thence downwardly toward the sieve a . A vent pipe z extends upwardly from the top of this shield and is provided at its upper end with a cock 2.

The jigger operates as follows: The pulp from a stamp mill or other crusher, or the tailings from another jigger is delivered with water into the feed box or receptacle m and is discharged therefrom through the openings n over the inclined plate h upon the sieve a . The surplus water overflows from the box or receptacle m into the trough o , from which it is conducted through the openings p into the hutch c . The material deposited upon the sieve is subjected uniformly throughout the entire width of the sieve to the pulsations imparted by the plunger e to the water in the hutch c . By the action of the pulsating current of water the material arranges itself in layers according to its specific gravity, the heavier particles working downward and the lighter particles upward. The small heavy particles pass through the sieve into the hutch from which they are withdrawn through the opening or openings l . The coarse heavy gravel or material which lies on or near the sieve, passing underneath the shield y , is discharged through the opening r into the box or receptacle q . This material, ragging or middlings, is withdrawn through the opening or openings t for crushing or other treatment. The quantity and quality of the ragging or middlings as well as the quantity and quality of the tailings are regulated by the adjustment of the shield y and by varying the height of the water in the gage and vent u , which determines the force of the current from the box or receptacle q through the discharge opening r against the flow of the ragging or middlings in the reverse direction. The height of the head or column of water above the opening r which may be observed in the open gage and vent u , is varied by the adjustment of the water supply to said box or receptacle q through the connection s . The closed box or receptacle q with its water supply connection s , the discharge opening r into it through the tail plate, and the open gage and vent u , is called a hydraulic gravel regulator. The lighter particles are carried as tailings over the shield y and inclined plate x through the openings or passages w into the feed box or receptacle of the succeeding jigger, or into a conduit by which they are conducted off as waste or for further treatment.

By the construction and arrangement

hereinbefore described of the plunger compartment and plunger which extend across the jigger at one end of the sieve, the entire width thereof, a comparatively wide sieve, viz: one of greater width than length, may be employed to advantage, and a uniform and more effective pulsation of water is produced the entire width of the sieve.

The water lessener reduces the volume of water required to operate the jigger and diminishes the flow of water over the sieve, which is a decided advantage where the amount of water is excessive. It also effects a saving in the finer floating particles which would ordinarily pass over the tail of the sieve, but are by this device conducted into the hutch to be further treated.

The hydraulic gravel regulator admits of a more effective separation of the ragging or middlings from the tailings, and affords better control of such separation according to the quantity and quality of the material to be treated on the jigger.

Under certain conditions and for certain purposes, the plunger may be located at the tail end instead of at the head end of the jigger, but the arrangement shown and hereinbefore described is preferred.

With ore of any given grade and with any given volume of water and sieves of the same area, a more perfect separation and concentration is effected in a shorter time by a sieve of greater width than length constructed and arranged with respect to the plunger and to the feed and discharge as shown and described, than by a sieve of greater length than width, irrespective of differences in the ratio between the specific gravities of the constituents of the ore. With the sieve of greater width than length having a plunger extending across the end thereof and supplied with ore at one end, pulsating currents of water are in parallel lines from one end of the sieve to the other, and the ore traveling over the sieve at a less rapid rate than over a sieve of greater length than width but of corresponding area, is subjected to a more effective jiggling action, and the constituent particles of the ore sooner assume positions in the bed corresponding with their specific gravities. In other words, a given quantity of ore moves at a slower rate over the wider sieve, and the advancing current being slower than in the case of a sieve having greater length than width does not interfere with the jiggling action of the pulsations of water tending to cause the constituent particles of the ore to arrange themselves in strata according to their specific gravities. With the narrower sieve, the more rapid and stronger current interferes with the jiggling action of the pulsations of water tending to remix the particles which the pulsations tend to ar-

range in strata. As a result, under the conditions above stated, a more perfect separation of the ore according to the specific gravities of its constituent parts is effected in a shorter time on the wider than on the narrower sieve of corresponding area.

Various changes in the details of construction of the machine and the arrangement of its parts may be made within the spirit and intended scope of the invention.

I claim:

1. In a jigger the combination of a sieve, a hutch below the sieve, a plunger compartment extending across the jigger at one end of the sieve transversely to the direction of the flow of ore and opening into the hutch below the sieve, a feed plate covering said compartment, a vent tube extending upwardly above the top of said compartment, and a reciprocating plunger fitted in said compartment and provided with a supporting and operating rod extending upwardly through said tube, substantially as described.

2. In a jigger the combination of a sieve, a hutch below the sieve, means for producing pulsations of water through the sieve, a feed box or receptacle having a discharge opening arranged to deliver pulp upon the sieve, and an overflow conduit leading from the feed box or receptacle above said discharge opening, substantially as described.

3. In a jigger the combination of a sieve, a hutch below the sieve, a plunger for producing pulsations of water through the sieve, a feed box or receptacle having a discharge opening arranged to deliver the pulp upon the sieve and an overflow conduit leading from said feed box or receptacle above said discharge and opening into the hutch below the sieve, substantially as described.

4. In a jigger the combination of a sieve, a hutch below the sieve having a water supply connection and a discharge opening, means for producing a pulsating current of water from the hutch through the sieve, a feed box or receptacle having an opening arranged to deliver the material to be treated upon the sieve, and a water lessener consisting of a trough or conduit communicating with the feed box or receptacle above the opening therein to the sieve and connected with the hutch below the sieve, substantially as described.

5. In a jigger the combination of a horizontal stationary sieve, a tail plate at the discharge side of the jigger and extending above the sieve and terminating at the top below the top of the remaining sides of the jigger, a hutch below the sieve, a closed gravel box or receptacle located below the top of the tail plate and having an opening above the sieve, an open water gage and air

vent extending above the top of the tail plate and communicating with said gravel box or receptacle, and an adjustable water supply connection arranged to maintain water at the desired level in said gage and vent above the top of the tail plate, substantially as described.

6. In a jigger the combination of a horizontal stationary sieve, a tail plate at the discharge side of the jigger and extending above the sieve and terminating at the top below the top of the remaining sides of the jigger, a hutch below said sieve, a closed gravel box or receptacle having an opening above the sieve and below the top of the tail plate, a shield extending over said opening and downwardly toward the sieve, an open water gage and air vent extending above the top of the tail plate and communicating with said gravel box or receptacle, and an adjustable supply connection for maintaining water at the desired height or level in said gage and vent above the top of the tail plate, substantially as described.

7. In a jigger the combination of a sieve, a hutch surrounding and extending above and below the sieve and having an overflow above the sieve, a closed gravel box communicating with the space above the sieve through an opening in the hutch and having an adjustable water supply connection, a covered shield extending over said opening and downwardly toward the sieve and having an air vent opening from the upper part thereof, said sieve extending underneath the overhanging shield so as to maintain an effective jigging bed within the space inclosed by the shield, substantially as described.

8. In a jigger the combination of a sieve, a hutch below the sieve having a water supply connection and a discharge opening, a shield extending over the tail end of the sieve and provided with an air vent, a gravel box or receptacle communicating with the interior of said shield above the sieve and having a water supply connection and a discharge opening and an open water gage extending above and communicating with said gravel box or receptacle, substantially as described.

9. In a jigger the combination of a sieve, a hutch below the sieve, having a water supply connection and a discharge opening, a gravel box or receptacle having a water supply connection, a discharge opening and an opening arranged to receive gravel lying next to the sieve, and a water gage located above said gravel box or receptacle and communicating therewith through vertical passages which alternate with horizontal passages for the tailings from the jigger, substantially as described.

10. In a jigger the combination of a hori-

zontally disposed sieve, a hutch below the
sieve having a water supply connection and
a discharge opening, a plunger compartment
extending across and above the head of the
5 sieve and communicating below it with the
hutch, a plunger fitted to work in said com-
partment and having rods extending up-
wardly through vent pipes at the top of said
compartment, suitable mechanism connected
10 with said rods for imparting a reciprocating
movement to said plunger, a feed box or
receptacle having an opening over the top of
the plunger compartment for delivering the
ore or pulp to the sieve, a water lessener con-
15 sisting of a trough or conduit into which
said feed box or receptacle opens above the
delivery opening to the sieve, and which is
connected with the hutch below the plunger,
a gravel box or receptacle having a water
20 supply connection, a discharge opening and
an opening just above the tail of the sieve, a
shield extending over the last mentioned
opening and downwardly toward the sieve,

and a water gage extending above and com-
municating with said gravel box or recepta- 25
cle, substantially as described.

11. In a jigger the combination of a sieve,
a hutch extending above and below the sieve,
an over-flow above the sieve, a discharge be- 30
low the over-flow and above the sieve, a
shield interposed between said discharge and
over-flow and extending over the sieve ad-
jacent to the discharge, whereby an effective
jigging bed is maintained within the space
inclosed by the shield, and a water supply 35
connection adapted to maintain a counter-
current of water through said discharge
against the out-flow of material from the
space within the shield to control the out-
flow of material, substantially as described. 40

In witness whereof, I hereto affix my sig-
nature in presence of two witnesses.

FREDERICK E. WOODBURY.

Witnesses:

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ALICE E. GOSS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."