

No. 807,661.

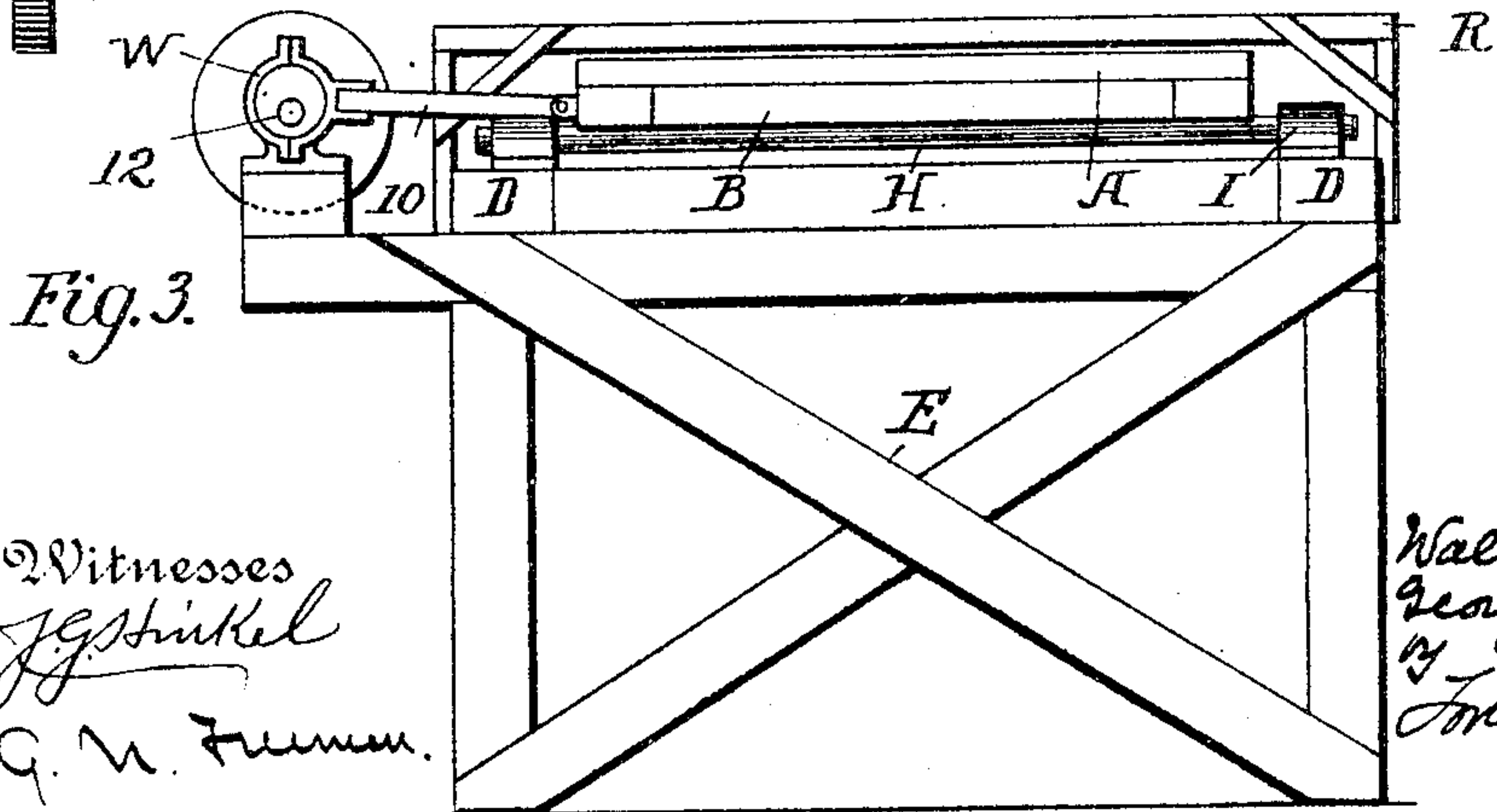
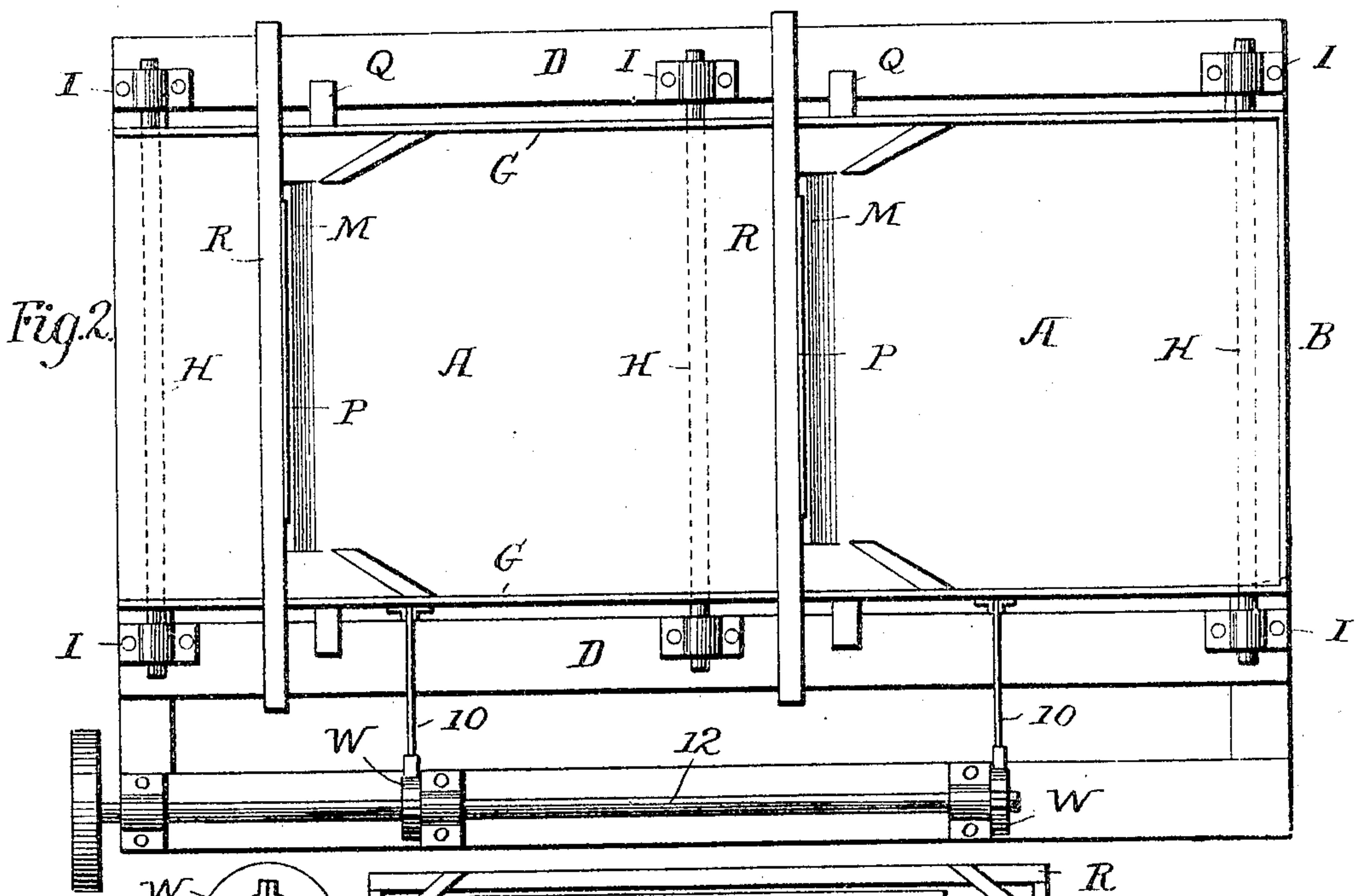
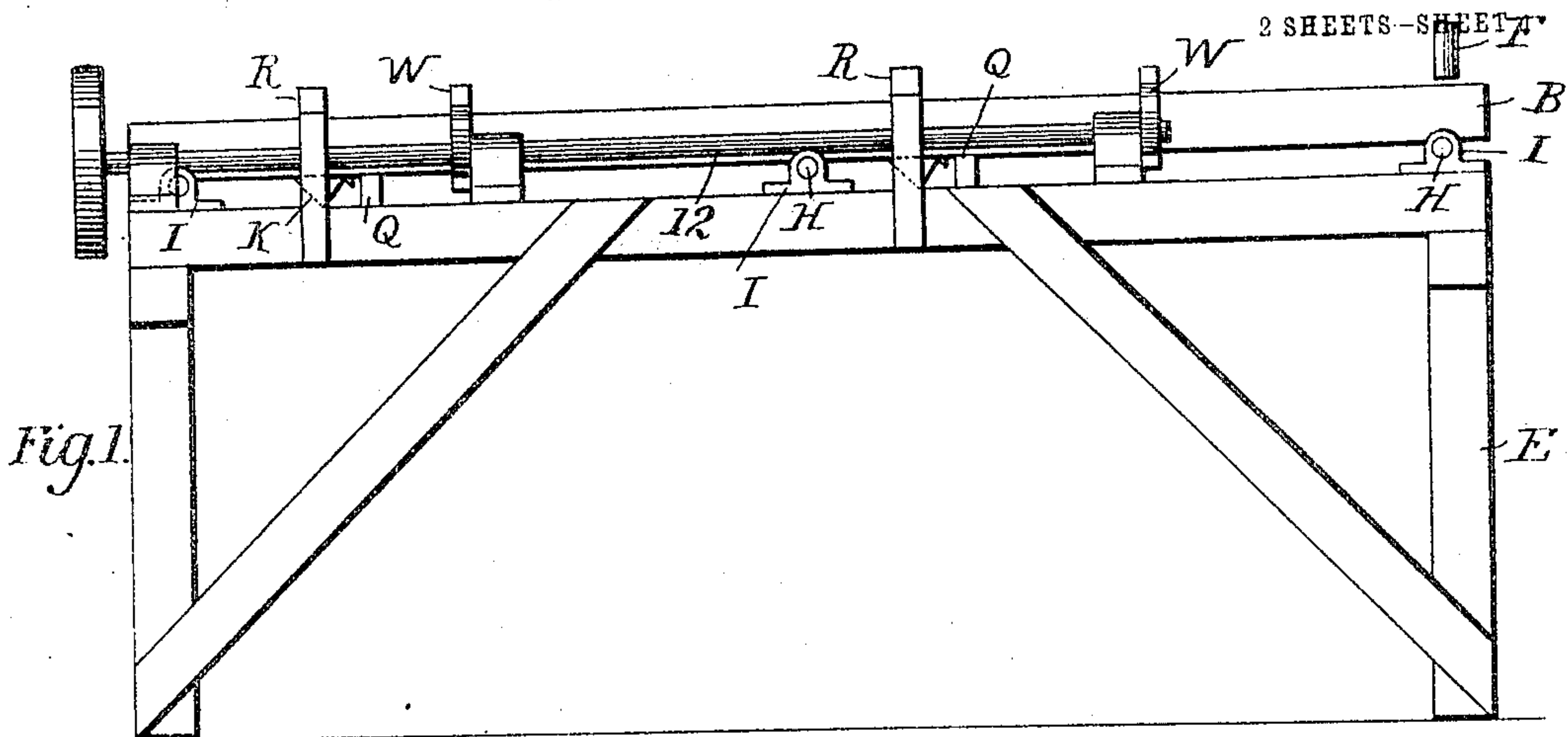
PATENTED DEC. 19, 1905.

W. S. & G. W. CRAVEN.

ORE CONCENTRATOR.

APPLICATION FILED MAR. 28, 1904.

2 SHEETS.-SHEET 7



2 Witnesses
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G. N. Freeman.

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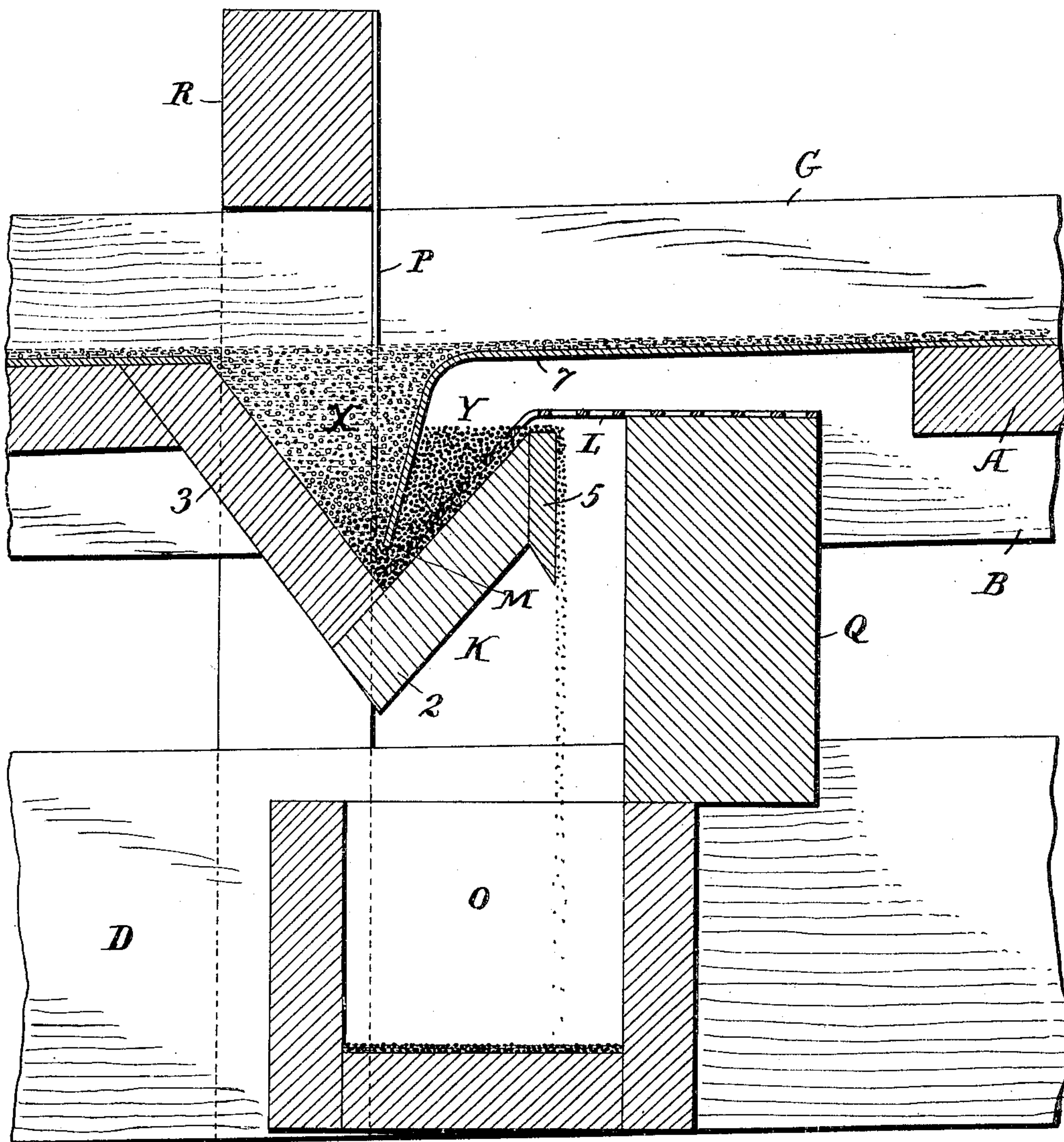
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2 SHEETS--SHEET 2.

Fig. 4.



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UNITED STATES PATENT OFFICE.

WALTER SIDNEY CRAVEN AND GEORGE WARREN CRAVEN, OF BUTTE,
MONTANA.

ORE-CONCENTRATOR.

No. 807,661.

Specification of Letters Patent.

Patented Dec. 19, 1905.

Application filed March 28, 1904. Serial No. 200,345.

To all whom it may concern:

Be it known that we, WALTER SIDNEY CRAVEN and GEORGE WARREN CRAVEN, citizens of the United States, residing at Butte, in the county of Silverbow and State of Montana, have invented certain new and useful Improvements in Ore-Concentrators, of which the following is a specification.

Our invention relates to ore separators or concentrators; and it consists in producing a separation of the ore and lighter material by causing the heavier material within agitated receptacles to displace the lighter material and pass to the bottom and to move upward in conduits by the pressure of the material in the receptacles and in the arrangement and operation of the apparatus, fully set forth hereinafter and illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of part of an apparatus embodying our improvements; Fig. 2, a plan view; Fig. 3, an end view, and Fig. 4 an enlarged section showing one of the boxes and adjacent parts and illustrating the action of the apparatus upon the material being concentrated.

The frame E of the apparatus is of any suitable construction required to support the operating parts and has inclined side rails D with boxes I, supporting cross-bars H, upon which rests a frame B, supporting one or more inclined platforms or decks A and which is surrounded by a rim G of suitable height. The frame B also carries at a point below the lower end of each table a box or trough K, which may be of any suitable shape in cross-section—either square, rounded, or, as shown, V-shaped—and formed by connecting two pieces 2 3 of plank nearly at right angles, the piece 3 extending up to the top of the next lower platform when a plurality of platforms are used and on the same plane as the platforms, while the piece 2 is less in height and extends to a cross-piece 5, and within the box or trough is formed a receptacle X and a conduit Y by the downward extension of a galvanized-iron plate 7, which covers the face and constitutes part of the platform, said downward end constituting a partition M, extending nearly to the bottom of the receptacle X. Below each box is a launder O, arranged to catch any matter which passes over the edge of the cross-piece 5 from the top of the conduit Y. Standards at the side of the frame support cross-

pieces R, from which extend agitators P of any suitable character, one projecting downward into each receptacle X, and other agitators L, supported by cross-pieces Q of the frame, extend into the conduits Y.

The frame B is reciprocated laterally in any suitable manner and at any suitable speed. For instance, the frame is connected by links 10 with the straps of eccentrics W upon a shaft 12, turning in bearings carried by the frame E and rotated from any suitable source of power.

A water-supply pipe F serves to introduce a limited portion of water onto the upper platform or table, and the material to be concentrated is deposited upon the table, sufficient water flowing thereto to insure the free movement of the particles among each other. As the frame B is reciprocated and as the material is thus agitated it will flow by gravity downward upon the tables or platforms and into and fill the receptacles, and during this movement upon the platforms heavier particles will begin to separate themselves before the material reaches the first receptacle, and as the receptacles are reciprocated the agitators P and L, which are relatively stationary, aid in so disturbing the contents of the receptacles and the conduits that gradually the heavier particles will settle to the bottom of the receptacles, while the lighter particles will, with the water, tend to accumulate at the upper portions of the receptacles, and the superior weight of the masses of material in such receptacles will gradually force the smaller masses of heavier material upward through the conduits to and from the upper ends of the latter, from which they will pass and fall into the launder O.

It should be understood that we do not depend upon water as a means of settling and sizing the material, but simply use it in a very limited proportion merely to insure a greater freedom of motion between the particles both in carrying and separating, so that there is almost no water in the conduits and at the lower portions of the receptacles and the discharge from the conduits is of a viscous character. It will be seen, therefore, that the discharge from the conduits over the edges of the lower sides of the troughs is the result of the superior weight of the mass of combined materials in the receptacles, and in general operations this is so much the case that there

would be no upward flow through the conduits if the mass was not maintained in agitation. It will be seen that as the line of discharge over the highest side of each trough is
 5 on the plane of the table or tables the chamber X is maintained full of the lighter material. Further, it will be seen that the flow of the water is in the direction of feed of the ore and tends mainly to move with the heavy
 10 particles (even when minute) to the discharge over the upper edge of the lower side of the trough.

While these agitators, as described, are stationary and serve to agitate the material because of the movements of the frame and
 15 boxes, it will of course be evident that agitators of any suitable form might be moved to secure the same result.

While we have shown a frame provided with a plurality of platforms and boxes, it will be evident that each frame may have a single platform and a single box, any suitable
 20 number of frames and platforms being employed, and that the different parts may be constructed and operated and proportioned differently from what is shown without departing from the main features of our invention.

Without limiting ourselves to the precise construction and arrangement shown, we claim—

1. An ore-concentrator having an inclined feed-table, means whereby water is supplied thereto in only sufficient quantity to insure
 35 the flow of ore and to flow with the latter, a trough at and extending beyond the lower end of the table, the edge of the trough farthest from the table on the same plane as the table, and the edge of the other side under and separate from the lower edge of the table, a partition extending from the table to near the
 40 bottom of the trough, and means for agitating the material in the trough substantially as set forth.

45 2. The combination in an ore-concentrator,

of an inclined table, means whereby water is supplied thereto in only sufficient quantity to feed the ore, a trough at the lower end of the table with a partition extending from the lower edge of the table nearly to the bottom,
 50 one side of the trough extending upward to the plane of the table to afford an overflow for the lighter material filling the space between the said side and partition, and the other side of the trough terminating on a plane below
 55 that of the table for the overflow of the heavier material, and means to maintain the contents of the trough agitated, substantially as set forth.

3. An ore-concentrator provided with a series of separated inclined platforms or tables on the same plane, a trough between each two tables with one side extending to the lower table and the other extending beneath but separate from the lower edge of the higher table,
 65 a partition extending from the higher table to near the bottom of the trough, and means for supplying a viscous mixture to and agitating the same in the troughs, substantially as set forth. 70

4. The combination in an ore-separator, of a series of inclined separated tables and intermediate troughs, a partition extending from the lower edge of each table nearly to the bottom of the adjacent trough, one side of each
 75 trough extending to the next lower table and the other side below and distant from the adjacent higher table, stationary blades extending into the troughs, and means for imparting a reciprocating lateral movement to the
 80 troughs, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WALTER SIDNEY CRAVEN.
 GEORGE WARREN CRAVEN.

Witnesses:

GEO. F. LYMAN,
 HOWARD F. KELLEY.