

(No Model.)

2 Sheets—Sheet 1.

G. McKAY & H. P. FAIRFIELD.

ORE SEPARATOR.

No. 291,067.

Patented Jan. 1, 1884.

Fig:1.

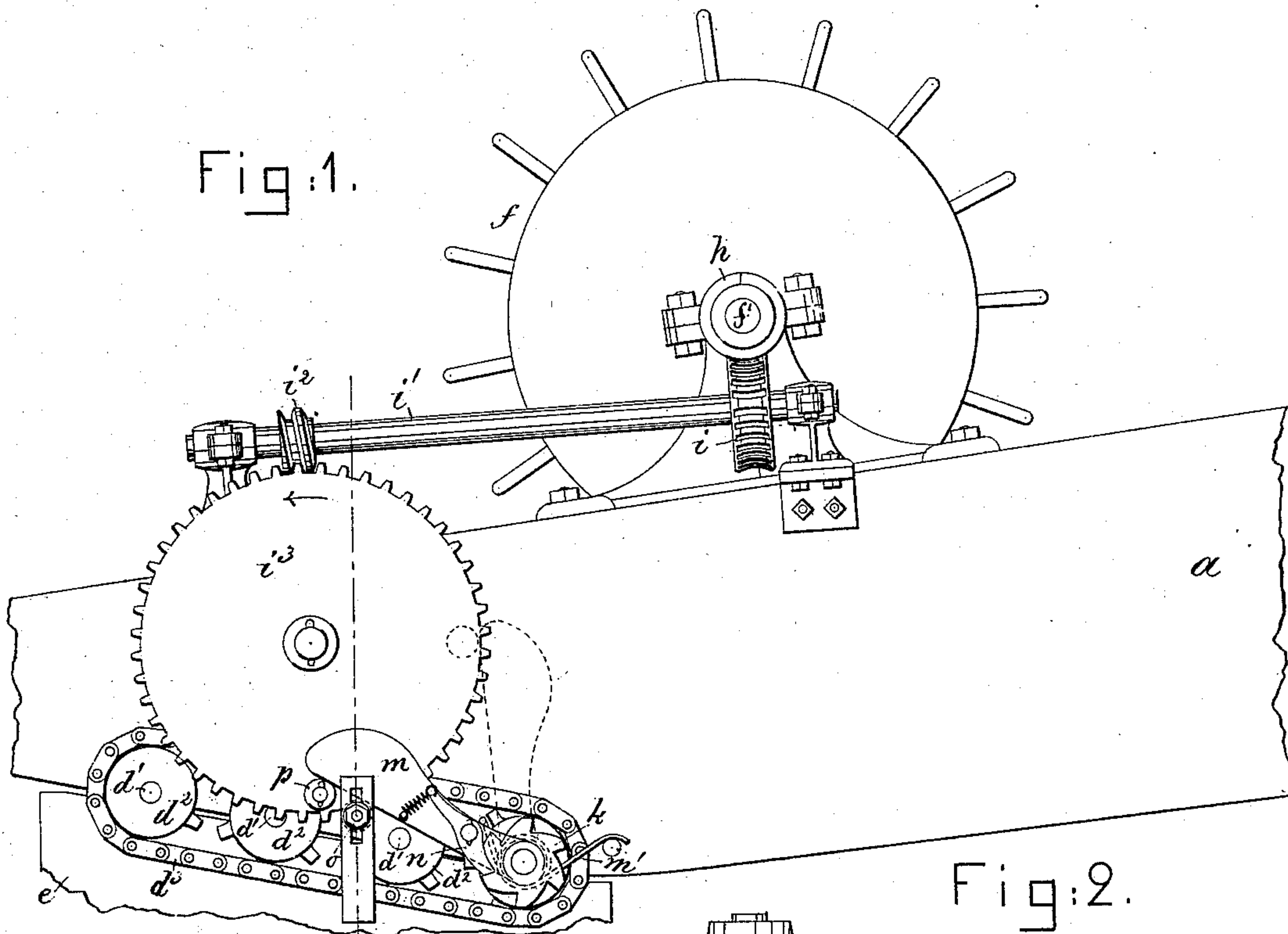
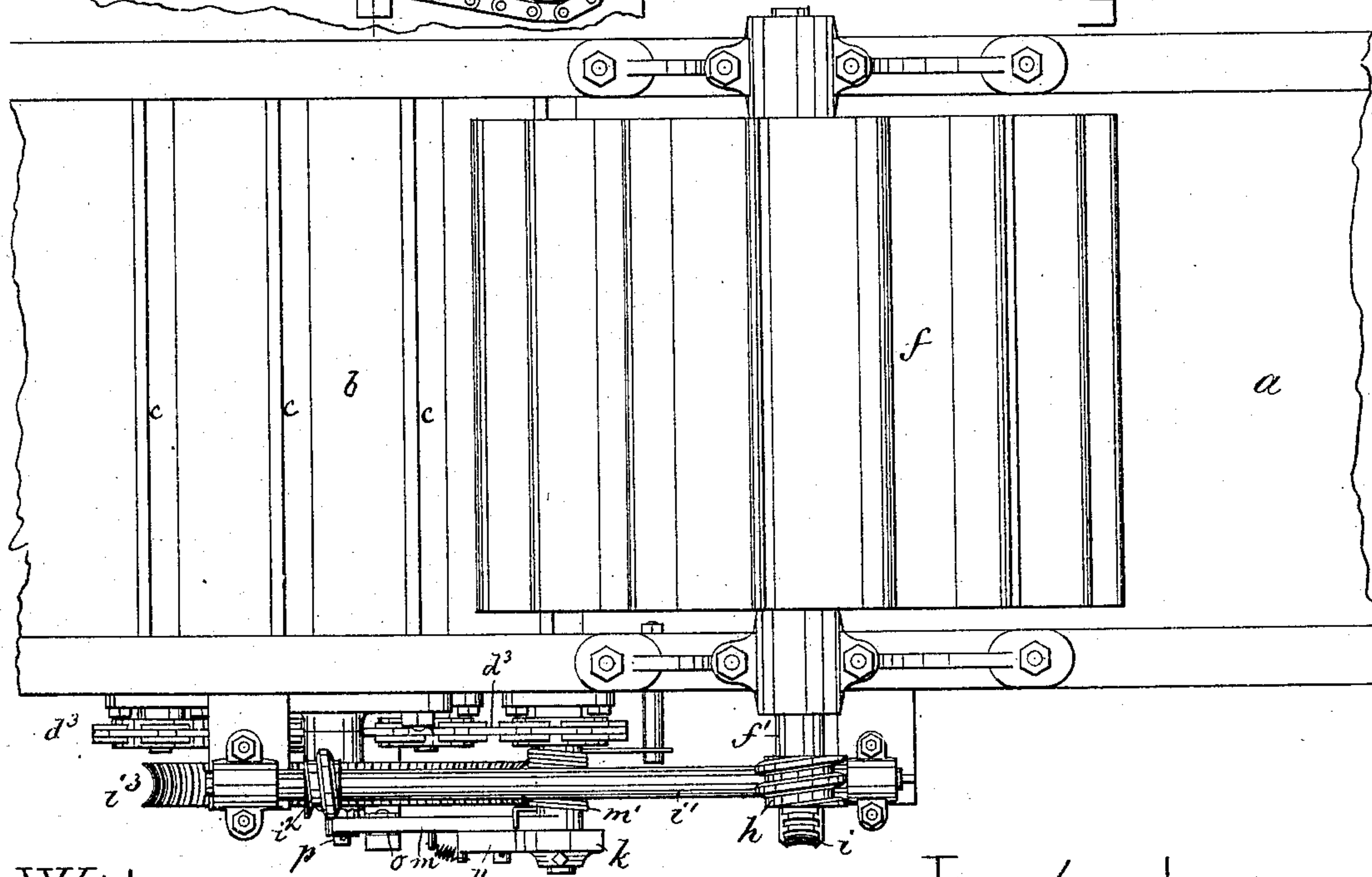


Fig:2.



Witnesses.

Fred A. Powell.

A. O. Ome

Inventors,
Gordon McKay & Hadley P. Fairfield
by Crosby & Gregory Attys.

(No Model.)

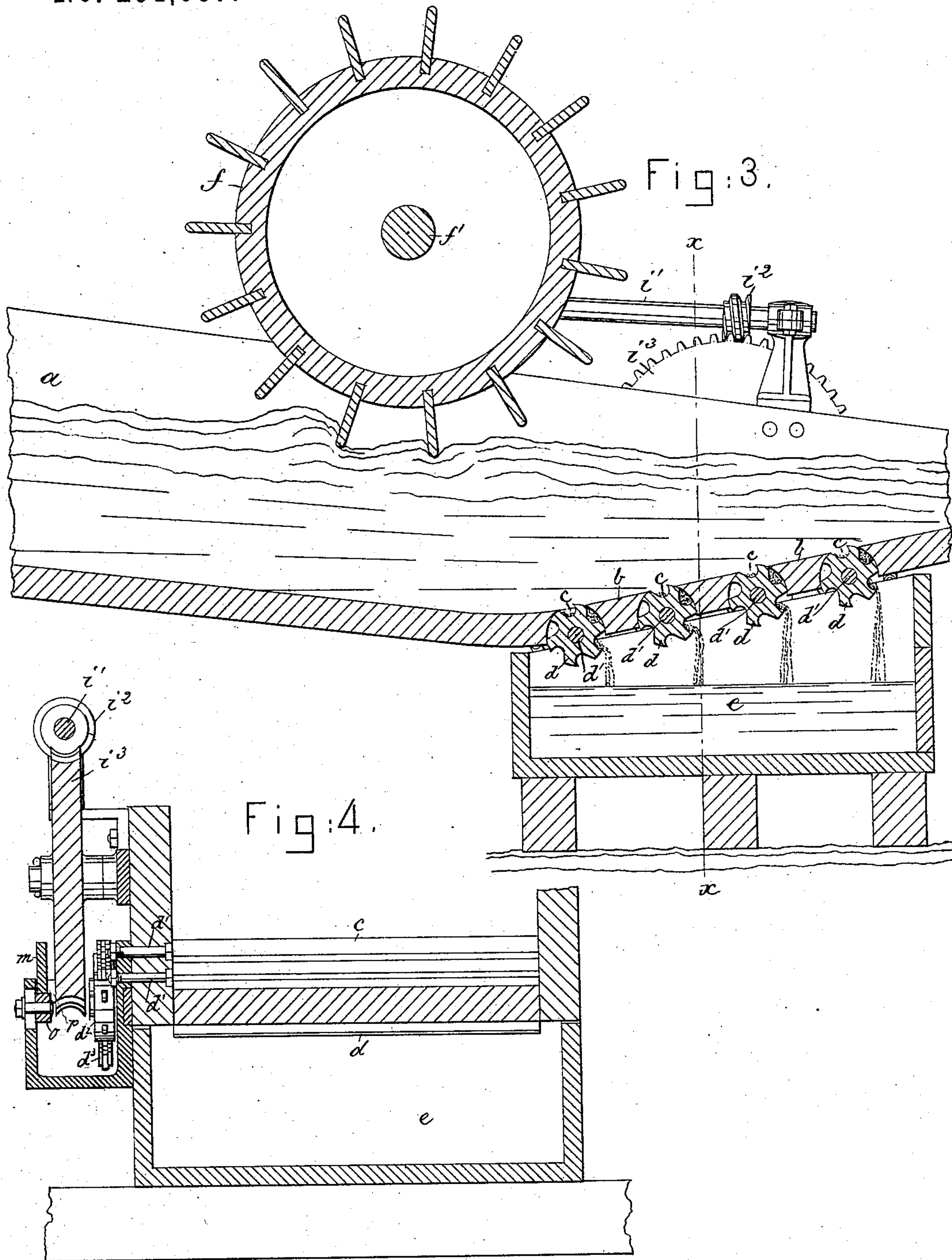
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Att'ys.

UNITED STATES PATENT OFFICE.

GORDON McKAY, OF NEWPORT, RHODE ISLAND, AND HADLEY P. FAIRFIELD, OF WEST MEDFORD, MASSACHUSETTS.

ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 291,067, dated January 1, 1884.

Application filed April 30, 1883. (No model.)

To all whom it may concern:

Be it known that we, GORDON McKAY, of Newport, county of Newport, State of Rhode Island, and HADLEY P. FAIRFIELD, of West Medford, county of Middlesex, State of Massachusetts, have invented an Improvement in Ore-Separators, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

Our invention relates to an ore-separator of that class in which the heavier and more valuable are separated from the lighter materials by the action of gravity.

In washing or separating ore, as heretofore generally practiced, the solid materials (a part of which are of comparatively small specific gravity and worthless, and another part of which are of greater specific gravity and valuable) are acted upon by a current of water or air, in which the heavier and more valuable particles tend to settle or seek a lower position, while the lighter particles remain in the upper part of the current. When a stream of water is employed, it has commonly been passed through a sluice or flume with a considerable velocity, the said flume being provided with obstructions, commonly called "riffles," along its bottom, which practically check the flow of the stream at these points, and gradually collect the heavier particles from the lower portion of the stream, the said particles having had time to settle in the momentary check in the velocity of the stream, while the lighter particles are carried over the tops of the obstructions or riffles and discharged. After this operation has been going on for a considerable length of time, the heavier material will gradually accumulate until it reaches the tops of the obstructions, after which there will be no further separation, and both the lighter and heavier material will pass on and be discharged. As commonly practiced, after the operation has been going on a sufficient length of time to accumulate as much of the valuable material as the riffles can retain, the operation is stopped and the water cut off from the sluice, and the latter is then cleaned up, or, in other words, has the accumulated valuable material removed from the riffles, leaving the apparatus ready to operate again as before to separate the materials. One or two plans have been proposed for discharging the valuable material

while the separation is going on, thus avoiding the necessity of stopping and cleaning up.

The present invention has for its object to produce a more efficient separator than that heretofore in use, and also to provide means for discharging the valuable material when separated from the worthless material without stopping the operation of separating; and the invention consists in the construction, combination, and arrangement of parts, as hereinafter particularly specified and claimed.

Figure 1 is a side elevation of a portion of a sluice provided with an ore-separating apparatus embodying this invention. Fig. 2 is a plan view thereof; Fig. 3, a longitudinal section, and Fig. 4 a transverse vertical section on line *x x*, Fig. 3.

The sluice *a*, of usual construction, and inclined as shown, to cause the water to flow at the proper velocity, has a portion of its bottom of less downward inclination, or upwardly inclined, as shown at *b*, Fig. 3, thus tending to produce a check in the flow of the water at such point. The said upwardly-inclined portion *b* of the bottom is provided with one or more riffles or shoulders, *c*, shown in this instance as formed by recessing a cylinder constituting the rotating riffle-carrier *d*, the latter being fitted into a suitable socket made in and through the under side of the bottom *b* of the sluice, as shown in the drawings, so that the said riffle-carrier forms a portion of the bottom of the flume. There will preferably be a number of the riffle-carriers, as shown, presenting a series of riffles to the stream. The stream charged with the materials to be separated flows over the riffle-carrier, and the uppermost riffle thereof causes a slight obstruction or eddy to check the flow of the fluid, which affords time for the heavier material, which is carried in the lower portion of the stream, to settle into the space of the riffle-carrier at the back of the riffle in the usual manner, the operation, however, being greatly improved, and the separation more thoroughly effected, on account of the said riffle being placed in the upwardly-inclined portion of the flume, where the velocity of the entire body of water receives somewhat of a check, tending in itself to separate and collect the heavier from the lighter matter.

It will be seen that by rotating the riffle-carriers *d* in their sockets in the bottom *b* of the

flume the recess or riffle *c* that has been uppermost and acted upon the stream flowing over it will be removed from the action of the said stream and a new one brought into its place, and that by the further rotation the said riffle *c*, that has been uppermost and arrested or become more or less charged with heavier material, will be brought to the under side of the riffle-carrier *d* and to the bottom *b* of the sluice or flume, when the heavy material will be discharged from the said recess back of the riffle, and will fall into the box *e*, placed to receive it, and made tight and strong, to prevent tampering of unauthorized persons. The riffle-carriers are shown in this instance as automatically rotated, to thus discharge their contents by mechanism actuated by the flow of the stream through the flume, the said mechanism being adapted to produce an intermittent movement of the riffle-carriers, turning them for a distance equal to the space between the adjacent riffles at the ends of certain intervals of time, so that one riffle is quickly removed from operative position and replaced by another. The actuating mechanism consists, in this instance, of a wheel, *f*, having buckets or wings, preferably of rubber, to resist the action of large stones or boulders carried by the stream, the shaft *f'* of the said wheel being provided with a worm, *h*, engaging the worm-gear *i* on a shaft, *i'*, provided with a worm, *i''*, meshing with a worm-gear, *i'''*, mounted on an axle at the side of the flume *a*. The shafts *d'* of the riffle-carriers *d* (see Fig. 1) are provided with sprocket-wheels *d''*, co-operating with a chain, *d'''*, so that the entire series are caused to move simultaneously; and one of the said shafts is provided with an actuating-ratchet, *k*, fixed thereon, and a pawl-carrier, *m*, loose thereon, provided with a pawl, *n*, to act upon the teeth of the said ratchet, which correspond in position with the different riffles or recesses *c* of the riffle-carriers. The said pawl-carrier *m* is weighted and acted upon by a spring, *m'*, tending to retain it supported on a stop, *o*, (shown as made vertically adjustable,) its end then lying in the path of a projection, *p*, carried by the gear *i'''*, so that in the continuous rotation of the said gear-wheel, produced by the movement of the wheel *f*, the pawl-carrier will be gradually raised to the position shown in dotted lines, Fig. 1, bringing the pawl *n* into engagement with the succeeding tooth of the ratchet *k*. When in the continued movement of the gear-wheel *i'''* the projection passes by the pawl-carrier *m*, the latter falls by the action of the spring *m'*, assisted by its own weight, and, through the pawl *n*, ratchet *k*, and chain and sprocket-gearing *d''' d''*, rotates the entire series of riffle-carriers, so as to present new and empty riffle-recesses to the action of the water in the bottom *b* of the flume and bring the previously-filled riffle-recesses in position to discharge their contents into the box *e*, as best shown in Fig. 3, after which the entire series of riffles will remain stationary until the pro-

jection *p* again operates the pawl-carrier after another revolution of the wheel *i'''*.

The gear will be so timed as to afford the proper interval between the successive operations of the pawl-carrier *m* to cause the riffle-recess to become filled.

The riffle-carriers *d* may be made of rubber, as this material is well adapted for resisting the abrasive action of the stream sweeping over it.

By the term "riffle" we mean a break or obstruction in the otherwise smooth or even surface over which the stream flows, constituting a space which becomes filled with dead or comparatively motionless water, in which the heavier material rapidly collects.

The riffle-carrier may be turned by hand.

We claim—

1. The combination of a sluice through which a stream is kept continuously running, a series of riffles having pockets or receptacles to receive the heavier particles, and mechanism, substantially as described, operated by the running stream in the sluice to automatically rotate said riffles periodically to discharge their contents and simultaneously present an empty pocket or receptacle for the reception of the material to be separated, substantially as and for the purpose specified.

2. The combination of a sluice through which a stream is kept continuously running, a series of riffles having pockets or receptacles to receive the heavier particles, mechanism, substantially as described, operated by the running stream in the sluice to automatically rotate said riffles periodically to discharge their contents and simultaneously present an empty pocket or receptacle for the reception of the material to be separated, and the tight strong box *e* beneath said riffles, into which the riffles discharge, substantially as and for the purpose specified.

3. The sluice, the series of riffles, the sprocket-wheels on the shaft of said riffles, the connecting-chain, a pawl-and-ratchet mechanism on the shaft of one of said riffles, and gearing connecting said mechanism with a wheel in the sluiceway, combined and arranged substantially as described.

4. The sluice and series of rotary riffle-carriers and connecting-gearing therefor, combined with the actuating-ratchet and pawl-carrier, and mechanism actuated by the flow of the stream in the sluice for moving the said pawl-carrier intermittently, as and for the purpose described.

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

GORDON McKAY.

HADLEY P. FAIRFIELD.

Witnesses as to signature of Gordon McKay:

SPIRITO BERNARDIN,

WM. L. WELSH.

Witnesses as to signature of Hadley P. Fairfield:

JAMES MASON,

D. J. COUGHLIN.