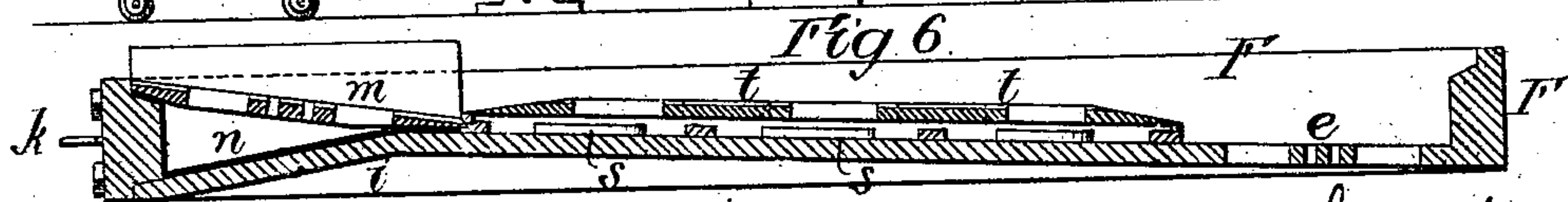
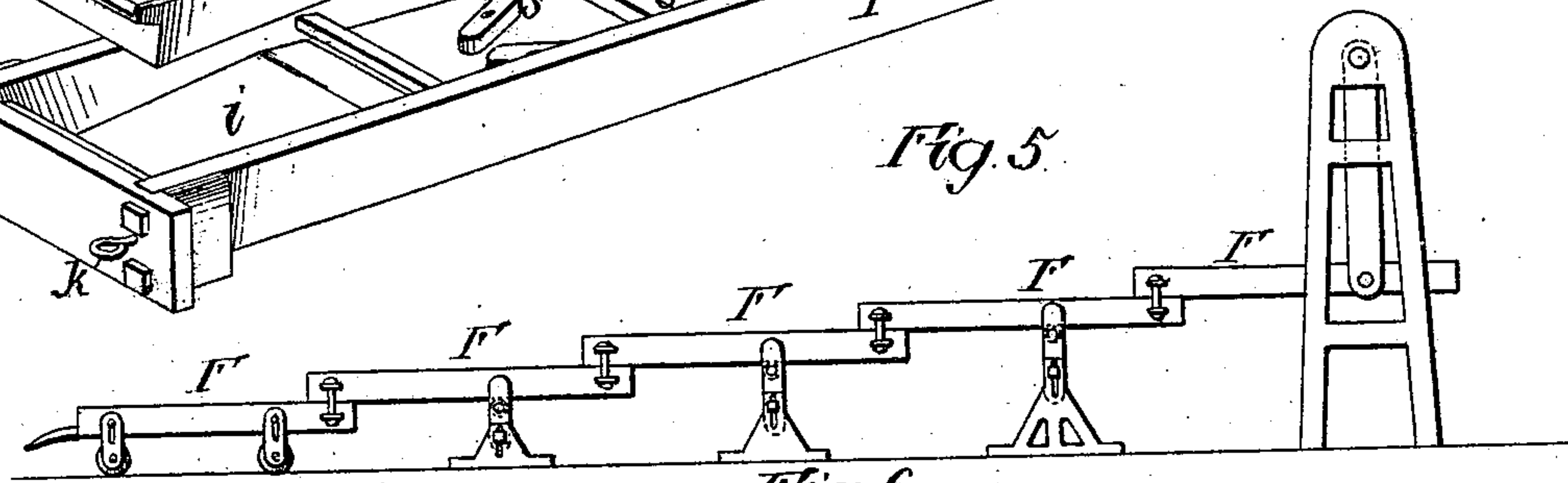
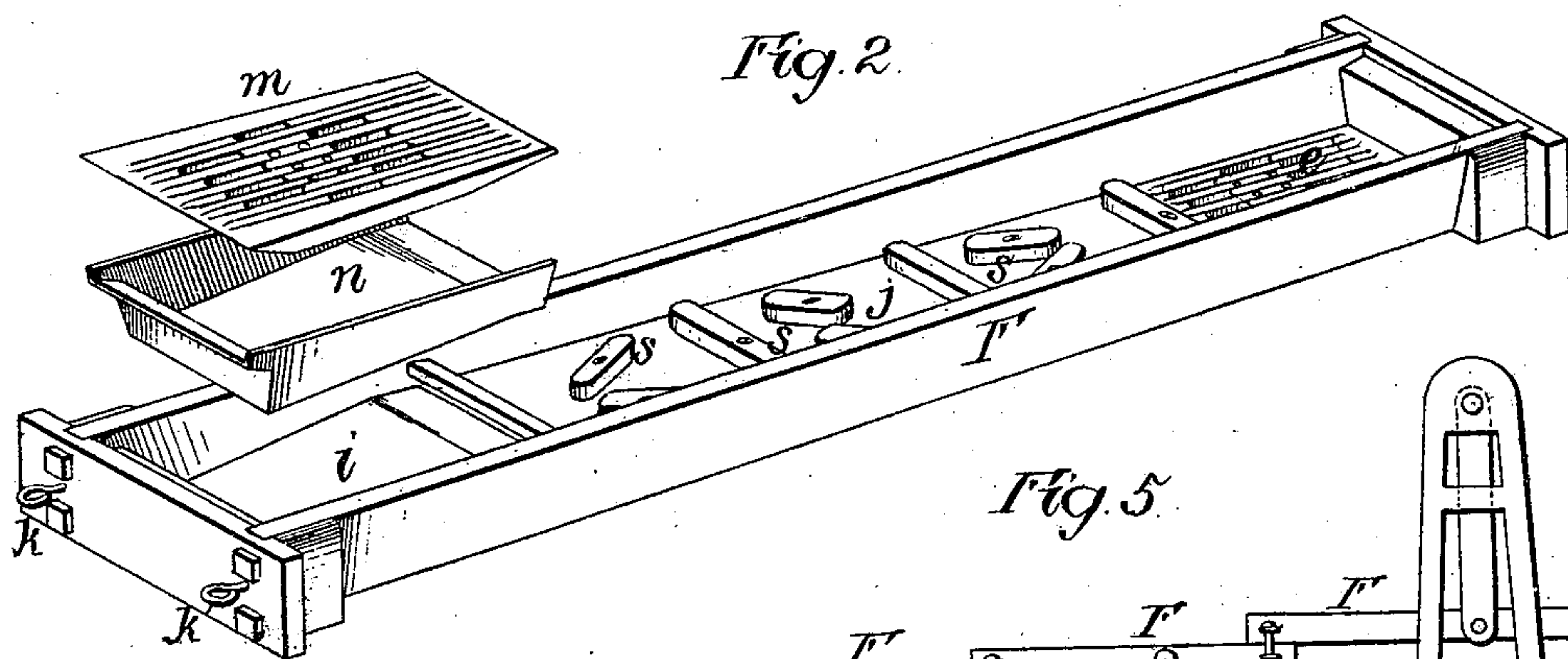
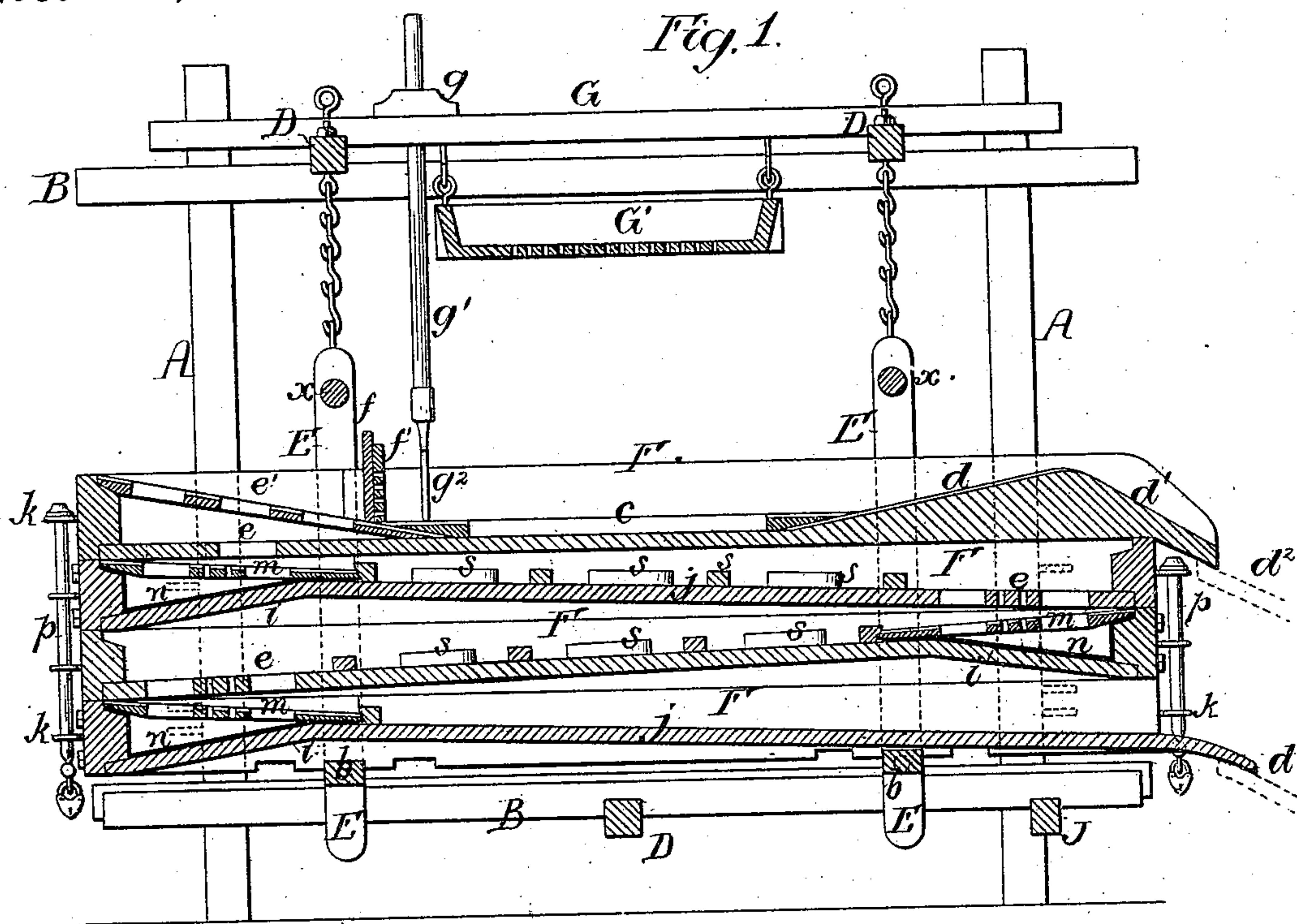


W. C. SHAW.
Ore-Washer.

No. 227,309.

Patented May 4, 1880.



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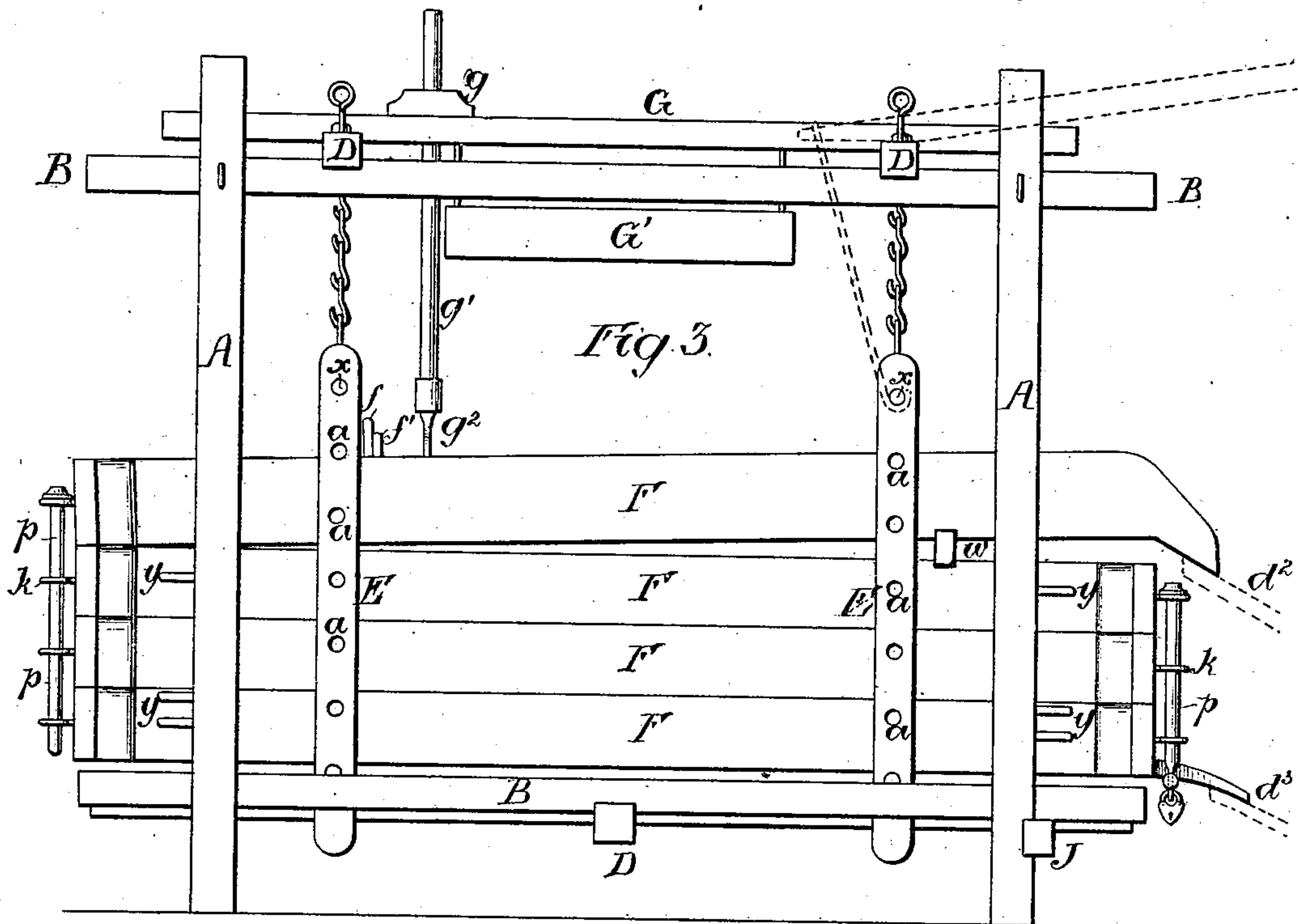
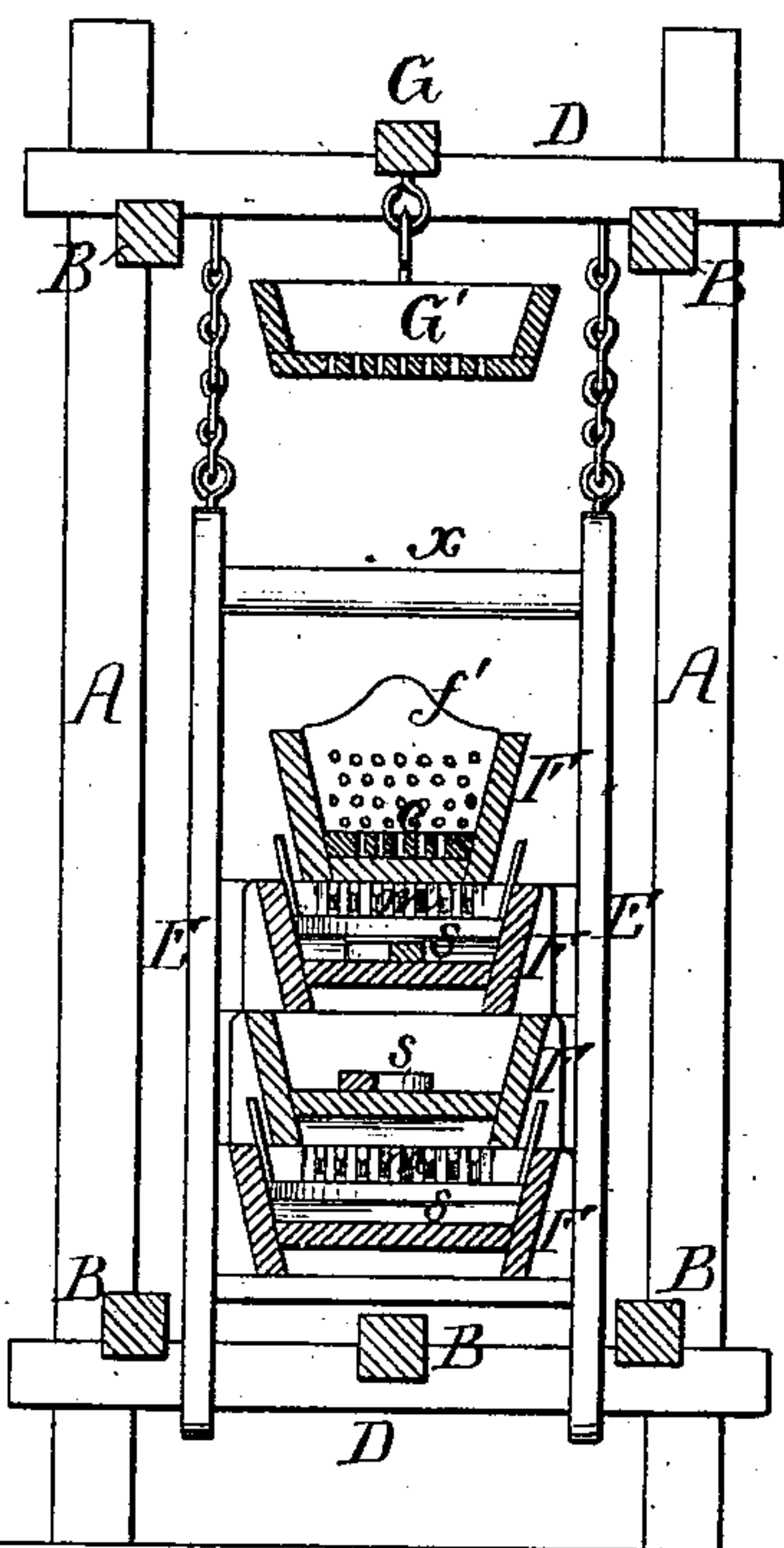


Fig. 4.



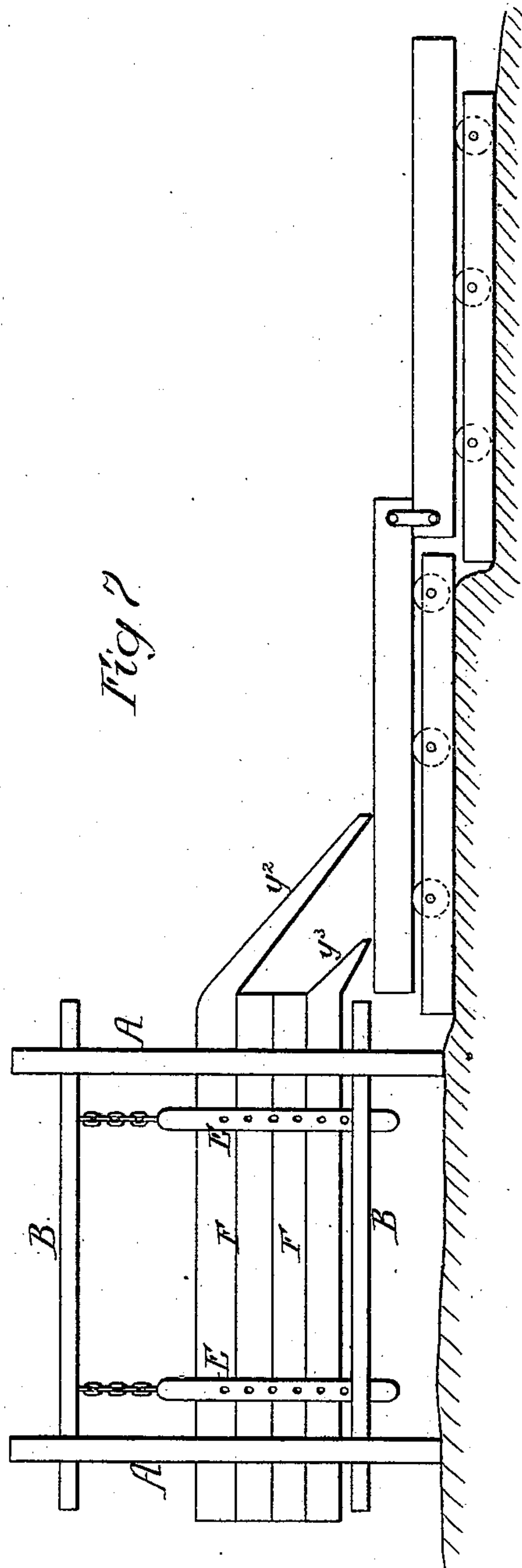
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UNITED STATES PATENT OFFICE.

WILLIAM C. SHAW, OF PHILADELPHIA, PENNSYLVANIA.

ORE-WASHER.

SPECIFICATION forming part of Letters Patent No. 227,309, dated May 4, 1880.

Application filed February 18, 1879.

To all whom it may concern:

Be it known that I, WILLIAM C. SHAW, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Ore Washers or Concentrators, of which the following is a specification.

The main object of my invention is to construct compact and simple apparatus for effecting the thorough washing and concentrating of auriferous ore or dirt or other mineral-bearing matter, a further object being to provide for the ready cleansing of the sluice-boxes and the removal of the deposits therefrom.

These objects I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1, Sheet 1, is a longitudinal vertical section of my improved ore washer and concentrator in the form which I prefer; Fig. 2, a perspective view of one of the sluice-boxes and the parts carried thereby; Fig. 3, Sheet 2, a side view; Fig. 4, a transverse vertical section on the line 1 2, Fig. 1; Figs. 5 and 6, Sheet 1, views illustrating modifications of my invention, and Fig. 7, Sheet 3, another modification.

The main supporting-frame of the machine (shown in Figs. 1, 3, and 4) consists of vertical posts A, longitudinal beams B, and transverse beams D, the whole being firmly bolted or otherwise secured together, so as to constitute a strong and substantial frame-work.

To the transverse beams D, at the top of the frame, are hung, by means of a chain of S-hooks or open links, two pairs of bars, E, each pair of bars having formed therein a series of openings, *a*, to either of which may be adapted the ends of a rod or bar, *b*, the latter rods serving as supports for a series of sluice-boxes, F, arranged one above another, a series of four boxes being shown in the drawings, but a greater or less number being employed in practice, as circumstances may suggest.

The top box of the series has in the bottom a grating, *c*, and at one end an incline, *d*, and chute *d'*, the latter communicating with the trough *d''*, (see dotted lines,) which leads to the usual tail-box.

The bottom of the opposite end of the box is grated, as shown at *e*, and above this grated portion is arranged an inclined grate, *e'*, at or

near the base of which is arranged a sliding gate, *f*, and in front of the latter a perforated screen, *f'*.

Hung to a longitudinal bar, G, on the top of the frame, is a trough or box, G', having a perforated bottom, and arranged above the center of the top sluice-box F. Through a bearing, *g*, on said bar G passes a rod, *g'*, which carries at the lower end a fork, *g''*, the latter touching or almost touching the surface of the grate *c* in the bottom of the top box F.

The second box of the series has an inclined bottom, *j*, grated at *e*, but terminating at the opposite end in a pocket, *i*, which is covered by an inclined grating, *m*, a metal pan, *n*, being fitted closely to the pocket, but not being secured to the pocket or to the box. On the inclined bottom *j* of the box are pivoted a number of riffle-bars, *s*.

The third box F of the series is exactly similar to the second box, having the inclined bottom *j*, grating *e*, pocket *i*, grate *m*, pan *n*, and riffle-bars *s*; but the bottom box has, in the present instance, no riffle-bars, and the end of the box opposite the pocket discharges into a trough, *d''*, leading to the tail-box.

The boxes of the set are arranged reversely—that is to say, the pocketed ends of the second box and the bottom box are under the grated ends *e* of the first and third boxes, and the pocketed end of the third box is under the grating *e* of the second box.

The end of each box is provided with eyes *k*, adapted for the reception of bolts *p*, which serve to prevent longitudinal or lateral movement of one box independently of the others, the bolts, also, when provided with suitable padlocks, serving to prevent such an elevation of one box above another as to permit access to the interior of the boxes for the purpose of abstracting their contents.

The sides of the pans *n* extend above the tops of the pockets to which they are fitted, as shown in Fig. 4, and the end of each box adjacent to the pocket is secured by bolts or otherwise, so that it can be readily detached in order to permit the longitudinal withdrawal of the pan from the pocket.

Each of the various inclined gratings employed in the apparatus has its surface grooved longitudinally, and the slots and openings

which form the gratings are staggered, so that one or more of the slots or openings must necessarily be in the path of the material flowing down any of the grooves of the grating.

5 At one end of the frame of the machine, near the bottom, is a transverse beam, J, with which the adjacent bars E may be brought into contact, as described hereinafter, in order to impart a jarring movement to the boxes F.

10 The operation of the machine is as follows: A load of ore or dirt is thrown into the top box F, and a stream of water is turned into the trough G', from which and onto the contents of the top box it descends in a number
15 of streams, which disintegrate the ore or dirt, the surplus water flowing over the incline d and down the chute d' and trough d^2 , carrying with it the lighter particles of the mass in the box.

20 A shaking motion is imparted to the bars E and the boxes F carried thereby, this motion being given by hand or by any suitable power-driven device, and being imparted through the medium of any desired arrangement of rods or levers. The extent of move-
25 ment will be determined largely by the character of the ore or dirt which is being worked. Thus, if the auriferous or other mineral particles are easily separated from the earth or
30 rock, a gentle swinging motion may be sufficient to effect the proper concentrating effect, while, if the valuable particles are difficult to separate, the bars E may be vibrated, so that those adjacent to the bar J are brought into
35 contact therewith and the jarring of the boxes thereby effected.

The gate f being raised to the desired extent, a stream of water flows beneath the same, carrying with it the finer and heavier portions
40 of the mass which have settled in the top box F; coarse particles being prevented by the screen f' from passing beneath the gate f , and still coarser particles being prevented from approaching the screen, owing to the action of
45 the rake g^2 . The water and material carried thereby, after passing under the gate f , spread over the grate e' , and pass through the same and through the grate e , falling thence onto the grating m , down which it passes, a por-
50 tion of the heavy particles passing through the grate and into the first pocket, i , where they are retained.

As the stream passes down the inclined bottom j of the box in the direction of the arrow,
55 still more of the heavy particles are caught and retained by the riffle-bars s , which break up and obstruct the current.

After passing through the grating e of the second box F, the stream and the material
60 carried thereby pass in the direction of the arrow through the third box F, still more of the heavy particles being caught in the pocket i and against the riffle-bars s of said box, from which the stream passes into the bottom
65 box, the pocket i of which receives and retains whatever heavy particles may have escaped the boxes above, the stream of water with the

worthless dirt passing off from the box through the trough d^3 to the tail box.

Fresh material is thrown into the top box 70 F from time to time, in order that the operation of the apparatus may be continuous.

In cleaning up after a day's work or at other times the boxes are separated, the contents of the pans n removed, and the material which 75 has been collected by the riffle-bars scraped up by hand, or the riffle-bars turned so as to be parallel with the sides of the boxes, and a stream of clear water then passed through the apparatus, so as to wash down the deposit, 80 which is collected by any suitable settling device at the discharge end of the lowest box F.

It will be noticed, on reference to Fig. 4, that the lowest box is the widest, and that the boxes gradually decrease in width toward the 85 top. The object of this arrangement is to gradually spread and diminish the force of the stream of water in its passage through the apparatus, and thereby insure the retention in the lower boxes of particles too light to be 90 retained in the upper boxes of the set.

If it is desired to remove any one of the pans n during the operation of the machine without separating the boxes the end of the box adjacent to the pan can be taken off, and 95 the pan withdrawn longitudinally, another pan being then introduced into its place and the end of the box reapplied.

The object of extending the sides of the pans n above the tops of the boxes is to prevent the 100 splashing or removal of any of the contents of the pan when the box above is elevated for the purpose of varying its angle in respect to the others. This changing of the angle of the boxes in respect to each other may be easily effected 105 by inserting filling pieces or strips w , as shown in Fig. 3. The gratings m also prevent the splashing out of any of the contents of the pockets by preventing the falling of large particles into the pockets. 110

The pockets in the boxes are V-shaped and the lowest portion of each pocket is at the point of the V. In a pocket of this form the heavy particles of ore or dirt collect in a mass 115 at the point of the pocket, from which they cannot readily be dislodged by the shaking of the box, but from which, when no pan is used, they can be readily and completely withdrawn through a valved pipe or opening communicating with said point of the pocket. 120

The height of the series of boxes above the ground may be varied either by shifting the transverse bars b , on which the boxes rest, or by removing one or more of the S hooks or links, by which the bars E are supported. 125

The raising of the boxes prior to effecting a change in the height of the bar b or bars E, may be effected by a lever resting on one of the beams D, and having a hooked rod for catching a transverse bar, x , near the top of 130 each pair of bars E.

When the bars E and the boxes have been raised by this means the boxes may be supported by transverse bars resting on pins y on

the end posts, A, until the bars E or *b* are elevated to the required height, when the boxes may be again supported by the bars *b*.

5 The supporting-chain of each of the bars E is hung to a hook, the stem of which passes through one of the beams D, and is provided with an adjusting-nut, whereby any of the bars E may be raised or lowered, so as to compensate for inequalities caused by wear or the
10 warping of the boxes.

It will be observed that the lowest box of the series is the only one which is moved directly by the bars E, the remainder of the boxes resting upon the bottom box and receiving their motion therefrom. By this means
15 the swinging movement of all of the boxes is uniform and is equal in extent to the distance traversed by the lower end of the bars E, where they are attached to the bottom box, so that a
20 long swing of the entire series of boxes is produced without demanding an extended vibration of the suspending-bars. If desired, chains or links might be substituted for the bars E; but the latter are preferred.

25 Another advantage of this method of supporting and operating the boxes is that in cleaning up the boxes may be thrown out of work, one after the other, as their contents are washed out. Thus the top box, after being
30 washed out, may be raised and supported by cross-bars resting on the pins *y*, and the stream turned into the second box, which, when cleaned out, can likewise be raised and supported, the stream being then turned into the third box,
35 and so on. By this means only those boxes which are actually at work have to be vibrated, and the number of boxes at work is gradually reduced, so that the operation of cleaning up is much facilitated.

40 The length of swing of the bars E without jarring may be changed either by shifting the beams D, to which the bars are hung, by shifting the position of the abutment-beam J, or by changing the position of the bars E longitudinally in respect to the boxes F.
45

It is not absolutely necessary in carrying out my invention that the boxes should be arranged one above another in a vertical line, as shown and described. For instance, the
50 boxes may be arranged as shown in Fig. 5, the operation of which will be readily understood.

In some cases it may be advisable to place above the riffle-bars *s* a grating, *t*, as shown in Fig. 6, in order to prevent any but the finer
55 particles settling on the bottom of the box and coming into contact with the riffle-bars.

With some classes of ore or dirt the arrangement shown in Fig. 7, Sheet 3, might be used to advantage. In this case the series of boxes
60 shown in Fig. 1 is combined with a number of tail-boxes running on rollers carried by frames, which rest upon the ground or upon any other suitable support.

The pans *n* may, if desired, be coated with
65 mercury on the inside, so that an amalgam will be produced as the auriferous dirt settles

in the pan, or the mercury may be deposited directly in the pocket without the pan, the joints at the end of the box in this case being packed with felt, leather, cork, or equivalent
70 material to prevent the escape of the mercury.

The above-described apparatus may be made almost wholly of wood by an ordinary mechanic, and furnishes a compact and simple means of
75 rapidly and effectively separating the valuable from the worthless parts of auriferous dirt or ore or other mineral bearing matter.

I claim as my invention—

1. The combination of the main frame A, the supporting and operating bars E, and the series of sluice-boxes F, arranged one above the
80 other in a vertical line, each box being independent of the others and readily separable therefrom, all substantially as set forth.

2. The combination of a device for supplying water, a trough or chute for carrying off the waste-water, and a series of sluice-boxes arranged in train between the point of supply and the point of discharge, said boxes varying
85 in width, as described, thereby causing the spreading of the stream of water and a decrease in the force of the same as it flows through the boxes, all substantially as set forth.
90

3. The combination of a frame, A, and a series of independent sluice-boxes resting one upon the other and readily separable from each other, with suspending devices, substantially as described, connected to the lowest box only of the series, said box imparting its
95 movement to the boxes above, all substantially as specified.
100

4. The combination of the box F with a movable gate, *f*, and screen *f'*, in front of the same, as specified.
105

5. The combination of the box F, having a screen, *f'*, with a rake, *g*², located in front of the screen, as set forth, and serving to prevent the access of large particles thereto, as specified.
110

6. The combination of water supplying and discharging devices with sluice-boxes F, each having at the head of the same a V-shaped pocket, the lowest portion of which is at the junction of the end and bottom of the pocket,
115 as set forth.

7. The combination of water supplying and discharging devices with sluice-boxes F, resting one upon another, each box having opposite sides with straight and parallel edges, but
120 having a bottom inclined in respect to said edges, as set forth.

8. The combination of a sluice-box having a pocket, *i*, with the grating fitted closely to the box above the pocket, so as to prevent access of ore or dirt to the latter except through the grating, as set forth.
125

9. The combination of a sluice-box, F, with a series of straight-faced riffle-bars, *s*, each secured to the box by a bolt or pin, on which
130 the riffle-bar can be turned so as to assume different angles in respect to the line of flow

of the material passing through the box, as set forth.

10. The combination of a series of sluice-boxes, having eyes *k*, with vertical bolts *p*,
5 adapted to the eyes and retained therein, as described, whereby the boxes are locked in position, as set forth.

11. The combination of a series of independent sluice-boxes, *F*, arranged one above the
10 other in a vertical line and carried by radius-bars *E*, with the end posts, *A*, having pins *y*, serving as supports for cross-bars, whereby one or more of the boxes *F* may be supported
15 free of the others, and thus held stationary or thrown out of work, as specified.

12. The combination of the sluice-boxes, having pockets *i*, with pans *n*, adapted to the pockets and having sides extended above the tops of the boxes, as set forth.

13. The combination of the sluice-boxes 20 with gratings *m*, having staggered slots and openings, and having their surfaces grooved longitudinally, as specified.

In testimony whereof I have signed my name to this specification in the presence of two sub- 25 scribing witnesses.

WM. C. SHAW.

Witnesses:

WILLIAM J. COOPER,
HARRY SMITH.